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**usaf ltr, 28 feb 1972**

# LASA TRAVEL-TIME ANOMALIES FOR 65 REGIONS COMPUTED WITH THE HERRIN TRAVEL-TIME TABLE, NOVEMBER 1966 VERSION

10 January 1968

Prepared For

AIR FORCE TECHNICAL APPLICATIONS CENTER
Washington, D. C.

By

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TELEDYNE INC.

Under

Project VELA UNIFORM



STATEMENT #2 UNCLASSIFIED



Sponsored By
ADVANCED RESEARCH PROJECTS AGENCY
Nuclear Test Detection Office
ARPA Order No. 624

# LASA TRAVEL-TIME ANOMALIES FOR 65 REGIONS COMPUTED WITH THE HERRIN TRAVEL-TIME TABLE, NOVEMBER 1966 VERSION

SEISMIC DATA LABORATORY REPORT NO. 204


| | |
|---|---|
| AFTAC Project No.: | VELA T/6702 |
| Project Title: | Seismic Data Laboratory |
| ARPA Order No.: | 624 |
| ARPA Program Code No.: | 5810 |
| Name of Contractor: | TELEDYNE INC. |
| Contract No.: | F 33657-67-C-1313 |
| Date of Contract: | 2 March 1967 |
| Amount of Contract: | $ 1,736,617 |
| Contract Expiration Date: | 1 March 1968 |
| Project Manager: | William C. Dean<br>(703) 836-7644 |

P. O. Box 334, Alexandria, Virginia


## AVAILABILITY

This research was supported by the Advanced Research Projects Agency, Nuclear Test Detection Office, under Project VELA-UNIFORM and accomplished under the technical direction of the Air Force Technical Applications Center under Contract F 33657-67-C-1313.

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## ABSTRACT

Travel-time anomalies at LASA, computed from 626 teleseisms with the November 1966 Herrin tables, are separated into various regions and then averaged. Several observations are made concerning the results.

## INTRODUCTION

This report presents the results of computing P-wave relative travel-time anomalies at all subarray center instruments at the Large Aperture Seismic Array (LASA) in Montana. The travel-time table used for computing expected times is the Herrin, November 1966 version.

A total of 626 teleseisms are used. As the anomalies are dependent upon event distance and azimuth, all of the results are separated into groups such that the subarrays have anomalies which are consistent within each defined region.

The following description explains the presentation of the results in the Appendix with these reference numbers appearing on the first page therein:

1. Source of expected travel times. In this report, the Herrin table, November 1966 version, is used;

2. Reference subarray, R, selected for computing relative anomalies. In this report, all anomalies are relative to subarray A0. The following relation may be used to change reference stations;

$$A_{i/j} = A_{i/r} - A_{j/r}$$

where $A_{i/j}$ is the anomaly at station i relative to a new reference station j.

3. All expected travel-times in this report have been corrected for the ellipticity of the earth such that the computed anomalies may be used in conjunction with other programs requiring these corrections.

4. An arbitrary geographic name given to the event region.

5. Range of epicentral distance in the event region.

6. Range of epicentral azimuth in the event region.

7. Date and arbitrary name given to each event.

8. Epicentral distance, in kilometers, from the reference subarray, R.

9. Epicentral azimuth, in degrees measured from north to east, from the reference subarray, R.

10. Subarray designator, i.

11. Measured travel-time anomaly, in seconds, at subarray i relative to subarray R for the kth event;

$$A^k_{i/r} = T^k_i - T^k_r - H^k_i + H^k_r$$

where T is the observed arrival time and H is the expected (Herrin 1966) travel time from the hypocenter of the kth event including correction for ellipticities but not for station elevations.

12. A fixed-point zero anomaly indicates that no reading was made at the subarray for that event.

13. The average anomaly at subarray i of N recorded events;

$$\bar{A}_{i/r} = \left( \sum_{k=1}^{N} A^k_{i/r} \right) / N$$

for the defined region.

14. Standard deviation, or error of estimate, at the ith subarray for N observations:

$$\sigma_i = \left\{ \left[ \sum_{k=1}^{N} \left( A^k_{i/r} - \bar{A}_{i/r} \right)^2 \right] / (N-1) \right\}^{\frac{1}{2}}$$

for the defined region.

15. Number of observations, N, at station i for the defined region.

16. Total number of epicenters included in the defined region.

17. Epicenter latitude, degrees (USC&GS); plus north, minus south.

18. Epicenter longitude, degrees (USC&GS); plus east, minus west.

19. Event depth, kilometers (USC&GS).

20. Event origin time, hours, minutes, seconds (USC&GS).

21. Standard deviation, or error of estimate, of the kth event in the defined region;

$$\sigma_k = \left\{ \left[ \sum_{i=1}^{L} \left( A^k_{i/r} - \bar{A}_{i/r} \right)^2 \right] / (L-1) \right\}^{\frac{1}{2}}$$

where L is the number of subarrays recording the kth event not including the reference subarray R.

22. Average error, or bias, of the kth event;

$$E_k = \sum_{i=1}^{L} \left( A^k_{i/r} - \bar{A}_{i/r} \right) / L$$

where L is the number of subarrays recording the kth event not including the reference subarray R.

23. Number of subarrays, L, recording the kth event, not including the reference subarray R.

The results in the Appendix are arranged first by general direction (beginning with the northwest and going clockwise) and second by increasing epicentral distance within each directional group (See Table I).

DISCUSSION

The following observations similar to those in a previous report using the Jeffreys-Bullen travel-time tables (Chiburis, 1966), are made concerning the LASA travel-time anomalies using the Herrin, November 1966 tables:

1. The anomaly variations between regions measured at a single subarray are as high as 1.66 seconds. For example, subarray F4 has an average anomaly of +0.74 sec (N = 19, $\sigma_{F4}$ = 0.13) for the No. Colombia region and an average of -0.92 sec (N = 12, $\sigma_{F4}$ = 0.07) for the Solomon Is. region.

2. Subarrays which are quite near the reference subarray A0 can have unusually large anomalies. For example, subarray D4 is located 30.75 km from A0 (center instrument to center instrument) and has ar anomaly relative to A0 of +0.83 sec. (N = 7, $\sigma_{D4}$ = 0.06) for the Dominican Republic-Mona Passage region.

3. The center instrument at subarray B2 is only 7.50 km from the center at A0, but it has an anomaly of -0.30 sec (N = 13, $\sigma_{B2}$ = 0.04) for the Yugoslavia-Albania-Greece-Mediterranean Sea Region. This result suggests that the time anomalies <u>within one subarray</u> (7 km diameter) are far from negligible. Signals recorded within a subarray can be significantly misaligned with anomalies as large as 0.30 sec.

4. The anomalies are not slowly varying functions of either distance or azimuth. For example, subarray F1 has an anomaly of +0.22 sec (N = 7, $\sigma_{F1}$ = 0.09) computed from events approaching from an east-southeastly direction at 5100 km distance (Virgin-Leeward Is. region), but at 4600 km (Dominican Republic-Mona Passage region) the anomaly is +0.84 sec (N = 7, $\sigma_{F1}$ = 0.07). Subarray F2, on the other hand, has an anomaly of +0.12 sec (N = 6, $\sigma_{F2}$ = 0.08) for events bearing 145° at 4800 km (So. Central America), whereas for events bearing 113° at a distance of 5100 km (Virgin-Leeward Is. region) the anomaly is -0.57 sec (N = 6, $\sigma_{F2}$ = 0.06). Hence, the anomaly at F1 changes by 0.62 sec in a distance range of 500 km, and at F2 it changes by 0.69 sec in an azimuth range of 32°.

5. The maximum anomaly range observed at LASA is 1.94 sec; average anomaly at subarray F2 is -1.01 sec for events occurring in Rumania; average anomaly at subarray E1 is +0.93 for events from the No. Colombia region.

6. The maximum anomaly range for one particular region (North Atlantic Ridge) is 1.43 sec, where the D4 anomaly is +0.47 sec and the F2 anomaly is -0.97.

## REFERENCES

Chiburis, E.F., 1966, "LASA Travel-Time Anomalies for Various Epicentral Regions", Seismic Data Laboratory Report No. 159, 13 September.

TABLE I

Distance-azimuth ranges by region

| Direction | No. of Regions | Distance Range, km | Azimuth Range, deg | No. of Events |
|---|---|---|---|---|
| Northwest | 15 | 2800-10900 | 292-329 | 214 |
| North | 6 | 5300-11000 | 340-016 | 36 |
| Northeast | 9 | 4700-10700 | 018-071 | 65 |
| East | 4 | 5700- 9900 | 075-103 | 16 |
| East-southeast | 3 | 4500- 5800 | 112-121 | 23 |
| Southeast | 13 | 3100-10800 | 132-170 | 133 |
| South | 8 | 2200-10100 | 158-192 | 49 |
| Southwest | 2 | 9500-10900 | 238-248 | 43 |
| West | 2 | 10600-11100 | 259-274 | 20 |
| Undefined | 3 | | | |
| Continental U.S. | | 683- 2900 | 101-281 | 7 |
| Eastern Is. and Pacific Ocean | | 4400-10800 | 184-253 | 6 |
| Miscellaneous | | 2100-9600 | 334-007 | 14 |

11 15 67 RELATIVE TRAVEL-TIME ANOMALIES

(1) HERRIN68 TRAVEL-TIME TABLES (3) INCLUDING ELLIPTICITY (2) REFERENCE STATION A0

(4)
ANOMALY REGION = CENTRAL AND SOUTHERN ALASKA
DISTANCE RANGE = 2886 TO 3352 KM AZIMUTH RANGE = 313.6 TO 320.0 DEGREES

| (7) EVENT NAME | (8) DISTANCE | (9) AZIMUTH | (5) B1 | (10) B2 | B3 | B4 | (6) C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 19 AUG66 GULF ALASKA | 2886.06 | 313.65 | .047 | .062 | -.086 | .016 | .129 | .067 | .002 | -.136 | .107 | .001 |
| 12 OCT 66 S ALASKA | 2901.32 | 315.93 | .067 | .070 | -.040 | .021 | .153 | .061 | -.090 | -.043 | .069 | 0 |
| 12 OCT 66 S ALASKA | 2930.64 | 315.64 | .101 | .133 | -.027 | .036 | .202 | .109 | .037 | .016 | .121 | .024 |
| 15 AUG66 S0 ALASKA 1 | 2934.38 | 315.29 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 02 SEP66 S0 ALASKA | 3028.48 | 314.85 | .128 | .080 | -.020 | .013 | .164 | .148 | .007 | 0 | .159 | .030 |
| 09 APR66 S0. ALASKA | 3039.38 | 314.61 | .127 | .061 | -.110 | .032 | -.007 | .118 | -.042 | -.080 | .128 | .031 |
| 06 NOV65 S ALASKA | 3059.03 | 315.42 | 0 | 0 | 0 | .057 | .072 | 0 | .017 | -.046 | .172 | .079 |
| 30 AUG66 S0 ALASKA | 3080.18 | 314.85 | .030 | .079 | -.024 | -.003 | 0 | .052 | -.103 | -.027 | .053 | -.053 |
| 30 AUG 66 S ALASKA | 3091.18 | 317.27 | .023 | .099 | -.038 | -.021 | 0 | .048 | -.021 | -.020 | -.049 | 0 |
| 22 JUN66 S. ALASKA | 3099.10 | 317.02 | 0 | 0 | -.116 | -.037 | -.052 | .129 | -.005 | -.009 | .041 | .029 |
| 01 SEP66 S0 ALASKA | 3207.22 | 317.44 | .050 | .051 | -.041 | -.032 | .017 | .054 | -.059 | -.075 | .000 | 0 |
| 15 AUG66 S0 ALASKA 2 | 3215.74 | 314.14 | .094 | .103 | 0 | .049 | .126 | .127 | 0 | -.044 | .076 | -.131 |
| 07 OCT 66 S ALASKA | 3228.97 | 314.94 | -.042 | .002 | -.016 | -.129 | .065 | 0 | .018 | -.041 | .029 | 0 |
| 26 MAY 66 ALASKA | 3267.19 | 315.17 | 0 | -.005 | -.078 | .001 | .162 | .115 | -.115 | -.002 | .006 | -.014 |
| 19 MAR 66 CEN ALASKA | 3300.19 | 315.16 | -.031 | -.057 | .041 | .031 | .111 | -.032 | -.027 | -.033 | -.058 | |
| 24 NOV65 C ALASKA | 3310.26 | 319.98 | .120 | .003 | 0 | -.029 | .052 | .048 | -.020 | -.089 | .119 | -.089 |
| 22 MAR66 S0. ALASKA | 3320.60 | 315.64 | .097 | -.014 | -.173 | -.007 | .062 | .094 | -.110 | -.067 | .137 | -.100 |
| 06 FEB66 S. ALASKA | 3327.32 | 314.20 | .092 | .048 | .002 | .033 | .018 | -.035 | -.039 | .072 | .178 | -.083 |
| 06 FEB67 SOUTH ALASK | 3351.54 | 313.55 | .132 | .020 | -.092 | .027 | .031 | .098 | -.048 | -.026 | .052 | -.086 |
| (13) AVERAGE | | | .070 | .046 | -.056 | .007 | .082 | .075 | -.030 | -.042 | .074 | -.020 |
| (14) SIGMA | | | .059 | .050 | .054 | .042 | .071 | .053 | .047 | .045 | .071 | .062 |
| (15) N | | | 15 | 16 | 15 | 18 | 16 | 16 | 17 | 17 | 18 | 13 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 19 AUG66 GULF ALASKA | 2886.06 | 313.65 | -.177 | .011 | -.101 | .043 | -.180 | -.190 | -.207 | -.314 | -.139 | -.098 |
| 12 OCT 66 S ALASKA | 2901.32 | 315.93 | -.173 | .002 | -.123 | -.014 | -.159 | -.193 | -.010 | -.305 | -.150 | .005 |
| 12 OCT 66 S ALASKA | 2930.64 | 315.64 | -.156 | .078 | 0 | .071 | 0 | -.209 | -.117 | -.192 | -.119 | -.035 |
| 15 AUG66 S0 ALASKA 1 | 2934.38 | 315.29 | 0 | 0 | 0 | 0 | -.192 | -.166 | -.112 | -.230 | -.145 | -.111 |
| 02 SEP66 S0 ALASKA | 3028.48 | 314.85 | -.086 | .086 | 0 | .037 | 0 | -.209 | -.146 | -.251 | -.056 | -.082 |
| 09 APR66 S0. ALASKA | 3039.38 | 314.61 | -.155 | .043 | 0 | .068 | .032 | -.302 | .008 | -.324 | -.098 | 0 |
| 06 NOV65 S ALASKA | 3059.03 | 315.42 | -.118 | .012 | 0 | 0 | 0 | -.165 | -.076 | -.100 | 0 | -.168 |
| 30 AUG66 S0 ALASKA | 3080.18 | 314.85 | -.084 | -.032 | -.266 | -.097 | -.121 | -.078 | -.094 | -.158 | .002 | -.200 |
| 30 AUG 66 S ALASKA | 3091.18 | 317.27 | -.119 | -.022 | -.320 | -.106 | -.168 | -.206 | -.100 | -.337 | -.068 | -.412 |
| 22 JUN66 S. ALASKA | 3099.10 | 317.02 | -.100 | .061 | -.178 | -.114 | -.038 | -.157 | .022 | -.175 | -.070 | -.149 |
| 01 SEP66 S0 ALASKA | 3207.22 | 317.44 | -.185 | 0 | -.208 | -.080 | -.177 | -.158 | -.098 | -.330 | -.163 | -.254 |
| 15 AUG66 S0 ALASKA 2 | 3215.74 | 314.14 | 0 | .109 | 0 | 0 | 0 | -.330 | 0 | -.432 | 0 | -.196 |
| 07 OCT 66 S ALASKA | 3228.97 | 314.94 | -.338 | -.158 | -.180 | -.134 | -.214 | -.225 | .867 | -.358 | -.200 | -.185 |
| 26 MAY 66 ALASKA | 3267.19 | 315.17 | -.177 | -.011 | -.198 | -.075 | -.001 | -.160 | -.131 | -.341 | -.123 | -.228 |
| 19 MAR 66 CEN ALASKA | 3300.19 | 315.16 | -.221 | -.158 | 0 | -.057 | -.211 | -.292 | -.045 | -.392 | 0 | -.438 |
| 24 NOV65 C ALASKA | 3310.26 | 319.98 | -.184 | .001 | -.043 | -.002 | 0 | -.188 | .032 | -.183 | -.090 | 0 |
| 22 MAR66 S0. ALASKA | 3320.60 | 315.64 | -.153 | .013 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 06 FEB66 S. ALASKA | 3327.32 | 314.20 | -.113 | -.010 | -.086 | -.033 | -.226 | -.245 | .025 | -.328 | .001 | -.891 |
| 06 FEB67 SOUTH ALASK | 3351.54 | 313.55 | -.062 | .005 | -.103 | .039 | -.116 | -.193 | -.131 | -.252 | -.024 | -.173 |
| AVERAGE | | | -.147 | .007 | -.164 | -.010 | -.136 | -.203 | -.061 | -.276 | -.093 | -.173 |
| SIGMA | | | .076 | .072 | .083 | .076 | .084 | .060 | .076 | .090 | .061 | .122 |
| N | | | 17 | 17 | 11 | 15 | 13 | 18 | 17 | 18 | 15 | 18 |

EVENT PARAMETERS

| (16) 19 EPICENTERS | (17) LATITUDE | (18) LONGITUDE | (19) DEPTH | (20) ORIGIN TIME | (21) SHOCK SIGMA | (22) AU. ERROR | (23) NO. STA |
|---|---|---|---|---|---|---|---|
| 19 AUG66 GULF ALASKA | 59.500 | -144.600 | 33 | 03 10 04.2 | .0577 | -.002 | 20 |
| 12 OCT 66 S ALASKA | 60.500 | -144.400 | 33 | 03 19 25.4 | .0520 | .011 | 19 |
| 12 OCT 66 S ALASKA | 60.400 | -145.000 | 25 | 08 20 30.0 | .0685 | .046 | 18 |
| 15 AUG66 S0 ALASKA 1 | 60.400 | -146.000 | 9 | 13 36 23.7 | .0567 | -.002 | 6 |
| 02 SEP66 S0 ALASKA | 60.200 | -146.900 | 31 | 22 46 39.5 | .0608 | .042 | 17 |
| 09 APR66 S0. ALASKA | 60.200 | -147.100 | 34 | 18 51 45.0 | .0674 | .016 | 18 |
| 06 NOV65 S ALASKA | 60.600 | -147.300 | 37 | 06 38 41.5 | .0875 | .055 | 12 |
| 30 AUG66 S0 ALASKA | 61.300 | -147.900 | 36 | 20 20 54.0 | .0643 | .006 | 19 |
| 30 AUG 66 S ALASKA | 61.500 | -147.500 | 33 | 20 23 10.0 | .0851 | -.039 | 18 |
| 22 JUN66 S. ALASKA | 61.400 | -147.700 | 93 | 11 38 53.7 | .0670 | .018 | 18 |
| 01 SEP66 S0 ALASKA | 61.800 | -149.600 | 77 | 23 19 09.8 | .0503 | -.028 | 18 |
| 15 AUG66 S0 ALASKA 2 | 61.200 | -150.000 | 98 | 19 37 16.0 | .0816 | -.034 | 12 |
| 07 OCT 66 S ALASKA | 61.600 | -150.100 | 56 | 20 55 56.0 | .0965 | -.052 | 18 |
| 26 MAY 66 ALASKA | 60.800 | -151.000 | 94 | 10 44 13.0 | .0606 | -.007 | 19 |
| 19 MAR 66 CEN ALASKA | 62.300 | -151.200 | 82 | 09 33 43.2 | .1095 | -.064 | 17 |
| 24 NOV65 C ALASKA | 63.200 | -151.000 | 129 | 08 22 38.7 | .0561 | .008 | 17 |
| 22 MAR66 S0. ALASKA | 61.100 | -152.000 | 100 | 10 28 59.0 | .0575 | -.024 | 12 |
| 06 FEB66 S. ALASKA | 60.400 | -152.300 | 91 | 23 28 07.8 | .0681 | .116 | 20 |
| 06 FEB67 SOUTH ALASK | 60.100 | -152.800 | 110 | 03 26 35.4 | .0440 | .009 | 20 |

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# R E L A T I V E  T R A V E L - T I M E  A N O M A L I E S

HERRIN66 TRAVEL-TIME TABLES  INCLUDING ELLIPTICITY  REFERENCE STATION  A0

ANOMALY REGION = NORTHEAST KODIAK
DISTANCE RANGE = 3234 TO 3355 KM  AZIMUTH RANGE = 307.2 TO 310.1 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 04 NOV65 KODIAK I | 3233.61 | 308.20 | 0 | 0 | 0 | 0 | .124 | 0 | 0 | -.032 | .120 | .075 |
| 22 APR66 KODIAK | 3274.99 | 307.19 | .049 | .041 | -.046 | -.051 | .040 | .093 | -.083 | -.120 | .190 | 0 |
| 30 DEC65 KODIAK I. | 3314.15 | 309.57 | 0 | 0 | 0 | 0 | 0 | 0 | .018 | 0 | .166 | -.100 |
| 19 MAR66 KODIAK | 3340.96 | 308.75 | .102 | .060 | -.063 | -.089 | .167 | .044 | .113 | -.017 | .214 | 0 |
| 22 DEC65 KODIAK I | 3354.60 | 310.11 | 0 | 0 | 0 | 0 | -.001 | .012 | -.027 | -.025 | .160 | -.040 |
| | AVERAGE | | .003 | .009 | -.054 | -.058 | .065 | .037 | .003 | -.051 | .165 | -.025 |
| | SIGMA | | .024 | .015 | .012 | .050 | .109 | .022 | .003 | .052 | .031 | .050 |
| | N | | 2 | 2 | 2 | 2 | 4 | 3 | 4 | 4 | 5 | 3 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 04 NOV65 KODIAK I | 3233.61 | 308.20 | .025 | -.021 | -.033 | .055 | 0 | -.135 | .137 | -.107 | .221 | -.026 |
| 22 APR66 KODIAK | 3274.99 | 307.19 | -.050 | -.054 | -.056 | .141 | -.001 | -.119 | .134 | -.327 | 0 | -.126 |
| 30 DEC65 KODIAK I. | 3314.19 | 309.57 | -.023 | -.000 | 0 | .009 | -.052 | -.269 | .071 | -.200 | .276 | -.031 |
| 19 MAR66 KODIAK | 3340.96 | 308.75 | -.045 | .055 | .012 | 0 | 0 | -.059 | .050 | -.179 | .209 | -.067 |
| 22 DEC65 KODIAK I | 3354.60 | 310.11 | -.052 | .040 | .071 | -.002 | -.103 | -.244 | .087 | -.120 | .170 | -.025 |
| | AVERAGE | | -.037 | .004 | -.002 | .076 | -.105 | -.164 | .096 | -.203 | .230 | -.050 |
| | SIGMA | | .043 | .046 | .056 | .061 | .065 | .080 | .030 | .076 | .053 | .043 |
| | N | | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 5 | 4 | 5 |

# E V E N T  P A R A M E T E R S

| EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 04 NOV65 KODIAK I | 57.480 | -151.100 | 33 | 10 30 22.0 | .0457 | .021 | 13 |
| 22 APR66 KODIAK | 56.900 | -151.800 | 33 | 10 19 51.0 | .0952 | -.021 | 10 |
| 30 DEC65 KODIAK I. | 58.100 | -152.400 | 33 | 16 33 43.4 | .6446 | -.007 | 12 |
| 19 MAR66 KODIAK | 57.700 | -153.000 | 2 | 06 10 47.0 | .0547 | .032 | 17 |
| 22 DEC65 KODIAK I | 56.300 | -153.070 | 0 | 15 41 21.0 | .0695 | -.021 | 16 |

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# RELATIVE TRAVEL-TIME ANOMALIES

HERRIN66 TRAVEL-TIME TABLES — REFERENCE STATION A0

INCLUDING ELLIPTICITY

ANOMALY REGION = SOUTHERN KODIAK
DISTANCE RANGE = 3355 TO 3394 KM AZIMUTH RANGE = 305.4 TO 307.8 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 29 AUG66 KODIAK | 3355.48 | 305.96 | .077 | .144 | -.046 | -.073 | 0 | .154 | .027 | -.077 | .143 | -.005 |
| 04 MAR66 KODIAK | 3372.43 | 307.36 | -.031 | -.077 | -.119 | -.111 | .032 | .010 | -.104 | -.153 | .079 | .033 |
| 11 APR66 KODIAK 1 | 3378.32 | 307.75 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16 APR66 KODIAK 1 | 3384.60 | 307.36 | -.040 | -.007 | -.090 | -.052 | .022 | -.049 | -.034 | -.144 | .070 | .045 |
| 16 APR66 KODIAK 2 | 3390.69 | 307.36 | .010 | -.027 | -.050 | -.022 | .022 | .021 | -.034 | -.094 | .070 | .035 |
| 22 JAN66 KODIAK | 3393.99 | 305.39 | -.092 | -.071 | -.131 | .011 | -.147 | -.090 | 0 | .043 | -.020 | -.056 |
| AVERAGE | | | -.015 | -.007 | -.087 | -.049 | -.018 | .009 | -.036 | -.085 | .067 | .011 |
| SIGMA | | | .063 | .091 | .039 | .047 | .086 | .093 | .054 | .070 | .061 | .042 |
| N | | | 5 | 5 | 5 | 5 | 4 | 5 | 4 | 5 | 5 | 5 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 29 AUG66 KODIAK | 3355.48 | 305.96 | .019 | -.046 | 0 | 0 | -.154 | -.090 | .143 | -.372 | -.092 | -.109 |
| 04 MAR66 KODIAK | 3372.43 | 307.36 | -.119 | -.028 | -.108 | 0 | -.248 | -.290 | -.096 | -.341 | 0 | -.359 |
| 11 APR66 KODIAK 1 | 3378.32 | 307.75 | 0 | 0 | -.121 | 0 | -.213 | -.098 | .004 | -.277 | 0 | -.204 |
| 16 APR66 KODIAK 1 | 3384.60 | 307.36 | -.029 | -.069 | -.109 | .003 | -.174 | -.179 | -.014 | -.336 | 0 | -.233 |
| 16 APR66 KODIAK 2 | 3390.69 | 307.36 | -.049 | -.109 | -.119 | .035 | -.203 | -.193 | -.023 | -.394 | -.003 | -.318 |
| 22 JAN66 KODIAK | 3393.99 | 305.39 | .017 | -.102 | -.057 | .043 | -.237 | -.179 | -.067 | -.398 | .091 | -.288 |
| AVERAGE | | | -.032 | -.071 | -.119 | .027 | -.224 | -.171 | -.009 | -.383 | -.014 | -.235 |
| SIGMA | | | .057 | .035 | .047 | .021 | .059 | .072 | .043 | .044 | .072 | .084 |
| N | | | 5 | 5 | 5 | 3 | 6 | 6 | 6 | 6 | 3 | 6 |

## EVENT PARAMETERS

| 6 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 29 AUG66 KODIAK | 56.300 | -153.100 | 33 | 22 30 22.8 | .0880 | .059 | 17 |
| 04 MAR66 KODIAK | 57.000 | -153.400 | 33 | 14 19 31.0 | .0677 | -.040 | 18 |
| 11 APR66 KODIAK 1 | 57.200 | -153.500 | 33 | 10 26 11.0 | .0904 | .034 | 6 |
| 16 APR66 KODIAK 1 | 57.000 | -153.600 | 33 | 01 27 15.3 | .0277 | -.001 | 19 |
| 16 APR66 KODIAK 2 | 57.000 | -153.700 | 33 | 04 40 45.0 | .0260 | -.000 | 20 |
| 22 JAN66 KODIAK | 56.000 | -153.700 | 33 | 14 27 07.9 | .0715 | -.021 | 19 |

11 15 67

# RELATIVE TRAVEL-TIME ANOMALIES

HERRIN68TRAVEL-TIME TABLES — REFERENCE STATION A0

INCLUDING ELLIPTICITY

ANOMALY REGION = ANDREANOF IS
DISTANCE RANGE = 4751 TO 5185 KM AZIMUTH RANGE = 302.2 TO 304.2 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 19 JUL66 ANDREANOF | 4751.00 | 302.35 | -.030 | .067 | -.042 | -.057 | .089 | .050 | .018 | -.103 | .192 | -.173 |
| 23 JUL66 ANDREANOF-3 | 4761.53 | 302.24 | .041 | .068 | -.111 | -.050 | .096 | .070 | .003 | -.123 | .159 | -.131 |
| 22 JUL66 ANDREANOF | 4769.01 | 302.41 | .144 | .068 | -.053 | -.047 | .000 | .042 | -.049 | -.045 | .154 | -.231 |
| 23 JUL66 ANDREANOF-2 | 4769.01 | 302.41 | .084 | .058 | .037 | -.067 | .130 | .112 | .001 | -.075 | .246 | -.021 |
| 23 JUL66 ANDREANOF-1 | 4770.47 | 302.44 | -.030 | .027 | -.083 | -.107 | .071 | .062 | -.099 | -.114 | .177 | -.142 |
| 15 NOV65 ANDREANOF | 4775.39 | 302.78 | 0 | 0 | 0 | 0 | .169 | 0 | .076 | 0 | .159 | 0 |
| 02 OCT66 ANDREANOF | 4839.05 | 302.64 | .049 | .090 | -.127 | -.038 | .044 | .111 | -.010 | -.160 | .109 | 0 |
| 24 OCT65 ANDREANOF | 4863.44 | 302.55 | .082 | .078 | -.035 | -.021 | .184 | .150 | .167 | .106 | .143 | -.049 |
| 22 NOV65 ANDREANOF-1 | 4914.58 | 303.68 | 0 | 0 | 0 | -.132 | .036 | -.004 | -.113 | -.078 | -.109 | -.193 |
| 03 MAY66 ANDREANOF | 4980.27 | 303.39 | .103 | .072 | -.036 | -.064 | .069 | .047 | -.028 | -.071 | .104 | -.183 |
| 28 JAN66 ANDREANOF | 4986.72 | 303.59 | -.054 | -.027 | -.138 | 0 | -.087 | -.009 | -.120 | -.174 | -.077 | -.171 |
| 09 MAR66 ANDREANOF | 4992.81 | 303.92 | -.029 | -.008 | -.121 | -.083 | .040 | .035 | -.094 | -.065 | .015 | -.114 |
| 24 FEB66 ANDREANOF | 5003.49 | 303.82 | -.030 | -.027 | -.101 | -.074 | 0 | 0 | 0 | 0 | 0 | 0 |
| 23 SEP66 ANDREANOF | 5020.98 | 303.30 | .113 | .105 | -.016 | -.002 | .116 | .101 | -.005 | -.044 | .185 | -.235 |
| 05 JAN66 ANDREANOF | 5031.07 | 303.32 | .015 | .007 | -.018 | -.130 | .006 | .046 | -.163 | 0 | 0 | 0 |
| 15 MAY66 ANDREANOF | 5046.70 | 303.81 | 0 | -.004 | -.002 | -.056 | .037 | .011 | .020 | -.110 | .047 | -.121 |
| 17 MAY66 ANDREANOF | 5093.80 | 303.39 | .045 | .057 | -.089 | -.050 | .037 | .047 | -.064 | -.049 | .092 | 0 |
| 27 MAY66 ANDREANOF | 5097.57 | 303.72 | 0 | -.003 | -.052 | -.028 | .084 | 0 | .031 | -.101 | .145 | -.089 |
| 04 MAR66 ANDREANOF | 5099.41 | 303.88 | -.007 | -.003 | -.054 | -.057 | .158 | .224 | -.030 | -.082 | .101 | -.118 |
| 03 MAY66 ANDREANOF | 5112.12 | 303.95 | -.030 | -.004 | -.234 | -.126 | -.041 | .024 | -.342 | -.112 | .044 | -.219 |
| 12 DEC65 ANDREANOF | 5118.47 | 303.99 | 0 | 0 | 0 | 0 | .093 | .024 | -.031 | -.064 | -.024 | -.066 |
| 25 MAR66 ANDREANOF | 5162.83 | 304.24 | .070 | -.002 | -.108 | 0 | .085 | .031 | -.034 | -.117 | -.043 | -.114 |
| 13 FEB67 ANDREANOF | 5166.64 | 303.66 | .042 | .040 | -.153 | -.121 | .032 | .107 | -.075 | -.116 | .018 | -.157 |
| 23 NOV65 ANDREANOF | 5173.78 | 304.15 | 0 | 0 | 0 | -.107 | -.008 | .082 | .018 | -.018 | -.064 | -.140 |
| 22 NOV65 ANDREANOF-2 | 5184.76 | 304.06 | 0 | 0 | 0 | -.058 | .140 | .182 | .120 | .081 | .083 | 0 |
| | AVERAGE | | .031 | .033 | -.077 | -.071 | .066 | .070 | -.027 | -.074 | .082 | -.140 |
| | SIGMA | | .060 | .042 | .062 | .038 | .066 | .059 | .078 | .066 | .098 | .099 |
| | N | | 18 | 20 | 20 | 21 | 24 | 22 | 24 | 22 | 23 | 19 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 19 JUL66 ANDREANOF | 4751.00 | 302.35 | .012 | -.054 | .030 | .021 | -.327 | -.079 | 0 | -.008 | -.212 | -.208 |
| 23 JUL66 ANDREANOF-3 | 4761.53 | 302.24 | -.055 | -.037 | .093 | .040 | -.349 | -.287 | -.085 | -.579 | -.239 | -.206 |
| 22 JUL66 ANDREANOF | 4769.01 | 302.41 | -.081 | -.135 | .083 | -.021 | -.419 | -.076 | 0 | -.611 | -.332 | -.114 |
| 23 JUL66 ANDREANOF-2 | 4769.01 | 302.41 | -.040 | .005 | .133 | .049 | -.279 | -.106 | .030 | -.581 | -.212 | -.134 |
| 23 JUL66 ANDREANOF-1 | 4770.47 | 302.44 | -.111 | -.054 | .135 | .078 | -.242 | -.105 | .034 | -.505 | -.176 | -.130 |
| 15 NOV65 ANDREANOF | 4775.39 | 302.78 | 0 | -.038 | .157 | -.020 | -.354 | -.127 | .021 | -.638 | -.221 | -.227 |
| 02 OCT66 ANDREANOF | 4839.05 | 302.64 | -.101 | 0 | -.081 | .053 | -.334 | -.113 | -.077 | -.622 | -.286 | -.220 |
| 24 OCT65 ANDREANOF | 4863.44 | 302.55 | -.029 | -.034 | -.087 | -.033 | -.293 | -.124 | -.263 | -.627 | -.294 | -.136 |
| 22 NOV65 ANDREANOF-1 | 4914.58 | 302.68 | -.015 | -.070 | -.070 | -.173 | -.473 | -.173 | -.297 | -.733 | -.304 | 0 |
| 03 MAY66 ANDREANOF | 4980.27 | 303.39 | -.069 | -.002 | .037 | -.024 | -.387 | -.137 | -.218 | -.674 | -.218 | -.204 |
| 28 JAN66 ANDREANOF | 4986.72 | 303.59 | -.126 | -.093 | -.143 | -.137 | -.366 | -.151 | -.227 | -.607 | -.305 | -.370 |
| 09 MAR66 ANDREANOF | 4992.81 | 303.92 | 0 | -.056 | -.102 | -.078 | -.448 | -.231 | -.333 | -.672 | -.388 | -.336 |
| 24 FEB66 ANDREANOF | 5003.49 | 303.82 | -.164 | -.071 | -.019 | 0 | 0 | -.244 | -.173 | 0 | 0 | -.241 |
| 23 SEP66 ANDREANOF | 5020.98 | 303.30 | -.070 | .048 | .046 | -.026 | -.333 | -.109 | 0 | -.641 | -.289 | -.234 |
| 05 JAN66 ANDREANOF | 5031.07 | 303.32 | -.102 | 0 | -.068 | -.163 | -.366 | -.246 | 0 | -.620 | -.325 | -.422 |
| 15 MAY66 ANDREANOF | 5046.70 | 303.81 | -.046 | -.040 | -.067 | -.029 | -.278 | -.041 | -.353 | -.541 | -.128 | -.182 |
| 17 MAY66 ANDREANOF | 5093.80 | 303.39 | -.024 | -.029 | -.073 | -.080 | -.310 | -.128 | -.289 | -.571 | -.224 | -.261 |
| 27 MAY66 ANDREANOF | 5097.57 | 303.72 | -.094 | .016 | .006 | -.047 | -.330 | -.092 | -.274 | -.559 | -.237 | -.273 |
| 04 MAR66 ANDREANOF | 5099.41 | 303.88 | -.120 | .007 | -.086 | -.047 | -.328 | -.201 | -.190 | -.559 | -.228 | -.263 |
| 03 MAY66 ANDREANOF | 5112.12 | 303.95 | -.182 | .009 | -.011 | -.038 | -.343 | -.212 | -.121 | -.633 | -.247 | -.349 |
| 12 DEC65 ANDREANOF | 5118.47 | 303.99 | -.054 | -.063 | -.011 | -.008 | -.283 | -.108 | -.263 | -.554 | -.192 | -.197 |
| 25 MAR66 ANDREANOF | 5162.83 | 304.24 | -.022 | -.114 | 0 | -.118 | -.313 | -.225 | 0 | -.545 | -.255 | -.234 |
| 13 FEB67 ANDREANOF | 5166.64 | 303.66 | -.146 | -.026 | 0 | -.120 | -.414 | -.171 | 0 | 0 | -.283 | -.253 |
| 23 NOV65 ANDREANOF | 5173.78 | 304.15 | -.061 | -.119 | -.157 | -.082 | -.284 | -.179 | -.284 | -.429 | -.215 | 0 |
| 22 NOV65 ANDREANOF-2 | 5184.76 | 304.06 | 0 | .029 | -.013 | -.032 | -.277 | -.128 | -.295 | -.521 | -.104 | 0 |
| | AVERAGE | | -.070 | -.040 | .005 | -.040 | -.339 | -.144 | -.189 | -.503 | -.243 | -.231 |
| | SIGMA | | .051 | .040 | .090 | .069 | .058 | .057 | .122 | .064 | .064 | .083 |
| | N | | 22 | 23 | 23 | 24 | 24 | 25 | 19 | 23 | 24 | 22 |

## EVENT PARAMETERS

| 25 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 19 JUL66 ANDREANOF | 51.700 | -173.300 | 47 | 19 20 33.4 | .0478 | .019 | 19 |
| 23 JUL66 ANDREANOF-3 | 51.600 | -173.400 | 41 | 14 39 48.3 | .0474 | .025 | 20 |
| 22 JUL66 ANDREANOF | 51.700 | -173.500 | 56 | 10 17 22.5 | .0682 | .005 | 19 |
| 23 JUL66 ANDREANOF-2 | 51.700 | -173.500 | 55 | 14 31 51.2 | .0925 | .069 | 20 |
| 23 JUL66 ANDREANOF-1 | 51.700 | -173.600 | 41 | 03 37 55.8 | .0850 | .034 | 20 |
| 15 NOV65 ANDREANOF | 51.900 | -173.800 | 46 | 07 13 04.0 | .0993 | .062 | 12 |
| 02 OCT66 ANDREANOF | 51.600 | -174.600 | 56 | 12 08 00.6 | .0536 | .015 | 18 |
| 24 OCT65 ANDREANOF | 52.100 | -175.300 | 49 | 03 39 07.7 | .0872 | .060 | 20 |
| 22 NOV65 ANDREANOF-1 | 52.000 | -176.100 | 49 | 14 00 27.0 | .0925 | -.067 | 16 |
| 03 MAY66 ANDREANOF | 51.600 | -176.800 | 20 | 12 06 54.0 | .0366 | .006 | 20 |
| 28 JAN66 ANDREANOF | 51.700 | -177.000 | 54 | 19 07 14.4 | .0914 | -.076 | 19 |
| 09 MAR66 ANDREANOF | 51.900 | -177.200 | 52 | 08 11 04.0 | .0783 | -.060 | 19 |
| 24 FEB66 ANDREANOF | 51.800 | -177.300 | 65 | 18 54 35.0 | .0546 | -.034 | 10 |
| 23 SEP66 ANDREANOF | 51.400 | -177.300 | 39 | 21 50 23.0 | .0580 | .027 | 19 |
| 05 JAN66 ANDREANOF | 51.200 | -178.100 | 33 | 07 01 58.0 | .0473 | -.061 | 15 |
| 15 MAY66 ANDREANOF | 51.500 | -178.400 | 31 | 14 46 06.5 | .0678 | .008 | 19 |
| 17 MAY66 ANDREANOF | 51.200 | -178.300 | 15 | 09 11 51.0 | .0397 | -.005 | 19 |
| 27 MAY66 ANDREANOF | 51.400 | -178.500 | 33 | 22 07 43.4 | .0428 | .011 | 18 |
| 04 MAR66 ANDREANOF | 51.800 | -178.600 | 53 | 11 35 03.4 | .0535 | .006 | 20 |
| 03 MAY66 ANDREANOF | 51.500 | -178.800 | 30 | 02 52 09.0 | .0752 | -.049 | 20 |
| 12 DEC65 ANDREANOF | 51.500 | -178.900 | 50 | 00 48 01.7 | .0496 | -.007 | 16 |
| 25 MAR66 ANDREANOF | 51.500 | -179.600 | 33 | 12 54 55.7 | .0546 | -.019 | 17 |
| 13 FEB67 ANDREANOF | 51.100 | -179.400 | 33 | 20 43 49.0 | .0494 | -.034 | 17 |
| 23 NOV65 ANDREANOF | 51.400 | -179.700 | 48 | 02 17 49.4 | .0850 | -.018 | 16 |
| 22 NOV65 ANDREANOF-2 | 51.300 | -179.800 | 40 | 20 25 30.4 | .0914 | .053 | 14 |

11 15 67 RELATIVE TRAVEL-TIME ANOMALIES

HERRIN(68)TRAVEL-TIME TABLES REFERENCE STATION A0

INCLUDING ELLIPTICITY

ANOMALY REGION = UNIMAK I.
DISTANCE RANGE = 4143 TO 4102 KM AZIMUTH RANGE = 303.1 TO 303.8 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 SEP66 UNIMAK | 4042.74 | 303.29 | .058 | .096 | .027 | -.025 | .112 | .121 | -.013 | .024 | .197 | .009 |
| 19 MAY66 UNIMAK I | 4057.94 | 303.17 | 0 | .127 | -.032 | -.056 | .109 | .121 | .039 | -.066 | .273 | -.058 |
| 27 FEB66 UNIMAK | 4079.63 | 303.07 | .175 | -.012 | -.122 | -.008 | 0 | .182 | .001 | .062 | .391 | 0 |
| 19 MAY66 UNIMAK I | 4081.10 | 303.42 | 0 | .067 | -.045 | -.055 | .075 | .085 | -.014 | -.080 | 0 | 0 |
| 30 DEC65 UNIMAK | 4093.87 | 303.47 | 0 | 0 | 0 | 0 | 0 | 0 | .025 | 0 | .266 | -.147 |
| 02 JAN66 UNIMAK | 4101.70 | 303.84 | 0 | 0 | 0 | .027 | .054 | .142 | -.060 | -.042 | .252 | -.107 |
| AVERAGE | | | .117 | .070 | -.043 | -.023 | .088 | .130 | -.004 | -.022 | .248 | -.076 |
| SIGMA | | | .083 | .059 | .061 | .035 | .020 | .036 | .035 | .063 | .003 | .067 |
| N | | | 2 | 4 | 4 | 5 | 4 | 5 | 6 | 5 | 5 | 4 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 SEP66 UNIMAK | 4042.74 | 303.29 | -.005 | .077 | .059 | .204 | -.220 | -.114 | .079 | 0 | -.178 | .072 |
| 19 MAY66 UNIMAK I | 4057.94 | 303.17 | .008 | .093 | .140 | .115 | -.229 | -.043 | .124 | -.522 | -.222 | .024 |
| 27 FEB66 UNIMAK | 4079.63 | 303.07 | .070 | .017 | .131 | .162 | -.280 | -.067 | .024 | -.504 | -.149 | .040 |
| 19 MAY66 UNIMAK I | 4081.10 | 303.42 | -.091 | .006 | .035 | .039 | -.314 | -.106 | .073 | -.565 | -.177 | .130 |
| 30 DEC65 UNIMAK | 4093.87 | 303.47 | -.013 | .085 | .087 | .095 | -.206 | -.180 | .051 | -.561 | -.253 | .123 |
| 02 JAN66 UNIMAK | 4101.70 | 303.84 | .044 | .029 | .129 | .065 | 0 | .021 | .108 | -.525 | -.236 | .049 |
| AVERAGE | | | .006 | .051 | .097 | .113 | -.251 | -.082 | .077 | -.535 | -.203 | -.073 |
| SIGMA | | | .055 | .038 | .043 | .061 | .047 | .069 | .038 | .027 | .040 | .044 |
| N | | | 6 | 6 | 6 | 6 | 5 | 6 | 6 | 5 | 6 | 6 |

EVENT PARAMETERS

| 6 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 16 SEP66 UNIMAK | 54.100 | -163.500 | 89 | 02 48 21.8 | .0497 | .008 | 19 |
| 19 MAY66 UNIMAK I | 54.000 | -163.700 | 85 | 09 18 35.0 | .0333 | .016 | 19 |
| 27 FEB66 UNIMAK | 53.900 | -164.000 | 40 | 20 43 00.3 | .0594 | .019 | 18 |
| 19 MAY66 UNIMAK I | 54.100 | -164.100 | 28 | 07 06 26.8 | .0481 | -.035 | 17 |
| 30 DEC65 UNIMAK | 54.100 | -164.300 | 28 | 02 06 31.1 | .0465 | -.020 | 13 |
| 02 JAN66 UNIMAK | 54.300 | -164.500 | 57 | 04 52 17.1 | .0427 | .003 | 16 |

11 15 67

# RELATIVE TRAVEL-TIME ANOMALIES

HERRIN66 TRAVEL-TIME TABLES — REFERENCE STATION A0

INCLUDING ELLIPTICITY

ANOMALY REGION = FOX IS

DISTANCE RANGE = 4204 TO 4664 KM AZIMUTH RANGE = 300.2 TO 303.4 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28 APR66 FOX I ALEUT | 4203.94 | 303.35 | -.027 | .072 | -.047 | -.060 | -.049 | -.026 | .010 | -.037 | .070 | -.200 |
| 07 MAY66 FOX IS | 4299.12 | 303.38 | .166 | .096 | .030 | .057 | .070 | .124 | .003 | .035 | .178 | 0 |
| 15 MAY66 FOX IS | 4337.10 | 303.20 | 0 | .038 | -.079 | -.086 | .035 | .054 | -.043 | -.106 | 0 | -.170 |
| 16 MAY66 FOX IS | 4343.51 | 303.22 | .064 | .108 | .021 | -.015 | .116 | .104 | .026 | -.036 | .194 | 0 |
| 05 MAY66 FOX IS | 4394.68 | 303.43 | .029 | .009 | -.082 | .045 | .020 | .090 | -.035 | -.080 | 0 | 0 |
| 24 APR66 FOX IS | 4430.13 | 302.44 | -.034 | .085 | -.045 | -.086 | .046 | .036 | -.068 | -.102 | .134 | 0 |
| 13 FEB67 FOX IS | 4482.13 | 302.34 | .085 | .117 | 0 | -.068 | .093 | .139 | .044 | -.005 | 0 | -.079 |
| 16 FEB66 FOX IS. | 4485.57 | 302.20 | .023 | 0 | -.064 | -.039 | .079 | 0 | -.003 | -.054 | 0 | -.067 |
| 03 JUL66 FOX | 4520.90 | 302.52 | -.021 | 0 | .022 | -.008 | 0 | .084 | .043 | -.059 | .183 | -.054 |
| 30 MAR66 FOX IS. | 4568.28 | 301.77 | .099 | .002 | 0 | -.146 | 0 | -.020 | -.015 | -.118 | .128 | -.223 |
| 04 DEC65 FOX IS. | 4490.57 | 300.91 | 0 | 0 | 0 | .017 | .108 | .103 | .029 | -.037 | .208 | -.031 |
| 30 NOV65 FOX IS | 4616.62 | 303.28 | .144 | .101 | .032 | .073 | .251 | .153 | -.014 | .039 | .200 | -.002 |
| 07 AUG 66 ALEUT. IS. | 4663.86 | 300.15 | -.002 | .011 | -.041 | -.113 | .029 | .124 | .063 | -.059 | 0 | 0 |
| | AVERAGE | | .048 | .064 | -.026 | -.033 | .073 | .087 | .003 | -.052 | .168 | -.103 |
| | SIGMA | | .069 | .045 | .044 | .068 | .076 | .066 | .038 | .043 | .065 | .083 |
| | N | | 11 | 10 | 10 | 13 | 11 | 12 | 13 | 13 | 8 | 8 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28 APR66 FOX I ALEUT | 4203.94 | 303.35 | -.114 | -.014 | -.062 | -.097 | -.250 | -.078 | -.017 | -.494 | -.141 | -.215 |
| 07 MAY66 FOX IS | 4299.12 | 303.38 | .000 | .001 | .029 | -.095 | -.265 | -.109 | -.075 | 0 | -.150 | -.099 |
| 15 MAY66 FOX IS | 4337.10 | 303.20 | -.005 | -.016 | 0 | .028 | -.249 | -.089 | -.096 | -.575 | -.156 | -.099 |
| 16 MAY66 FOX IS | 4343.51 | 303.22 | .004 | .075 | .038 | -.003 | -.231 | -.079 | .108 | -.529 | -.209 | -.066 |
| 05 MAY66 FOX IS | 4394.68 | 303.43 | -.095 | .012 | .136 | .063 | -.278 | -.080 | .076 | -.600 | -.130 | -.093 |
| 24 APR66 FOX IS | 4430.13 | 302.44 | -.037 | -.039 | .084 | .031 | -.258 | -.119 | -.002 | -.613 | -.249 | -.105 |
| 13 FEB67 FOX IS | 4482.13 | 302.34 | -.025 | -.007 | .124 | -.093 | -.255 | 0 | .022 | -.508 | -.178 | -.119 |
| 16 FEB66 FOX IS. | 4485.57 | 302.20 | 0 | 0 | .174 | .069 | -.215 | .037 | .032 | -.620 | -.138 | -.127 |
| 03 JUL66 FOX | 4520.90 | 302.52 | -.043 | .030 | .121 | .036 | -.250 | -.036 | -.035 | -.560 | -.214 | -.126 |
| 30 MAR66 FOX IS. | 4568.28 | 301.77 | -.111 | -.110 | .089 | .026 | -.284 | -.090 | -.133 | -.579 | -.125 | -.154 |
| 04 DEC65 FOX IS. | 4490.57 | 300.91 | -.006 | .020 | .071 | -.009 | 0 | -.041 | 0 | -.534 | 0 | -.046 |
| 30 NOV65 FOX IS | 4616.62 | 303.28 | -.043 | .106 | .037 | .128 | -.203 | .093 | -.009 | -.543 | -.163 | -.139 |
| 07 AUG 66 ALEUT. IS. | 4663.86 | 300.15 | 0 | -.021 | .073 | -.003 | -.225 | -.075 | -.093 | -.446 | -.079 | -.149 |
| | AVERAGE | | -.043 | .004 | .078 | .035 | -.247 | -.065 | -.018 | -.550 | -.161 | -.118 |
| | SIGMA | | .044 | .055 | .061 | .058 | .024 | .045 | .072 | .052 | .046 | .043 |
| | N | | 11 | 12 | 12 | 13 | 12 | 12 | 12 | 12 | 12 | 13 |

## EVENT PARAMETERS

| 13 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 28 APR66 FOX I ALEUT | 53.800 | -165.900 | 33 | 06 41 17.0 | .0758 | -.046 | 20 |
| 07 MAY66 FOX IS | 53.600 | -167.300 | 55 | 17 09 16.0 | .0495 | .018 | 18 |
| 15 MAY66 FOX IS | 53.400 | -167.800 | 33 | 04 34 11.0 | .0416 | -.027 | 17 |
| 16 MAY66 FOX IS | 53.400 | -167.900 | 15 | 23 16 35.0 | .0472 | .021 | 19 |
| 05 MAY66 FOX IS | 53.400 | -168.700 | 25 | 00 22 27.0 | .0478 | -.004 | 18 |
| 24 APR66 FOX IS | 52.700 | -168.900 | 60 | 15 13 36.1 | .0469 | -.031 | 19 |
| 13 FEB67 FOX IS | 52.500 | -169.600 | 51 | 10 07 34.5 | .0377 | .024 | 17 |
| 16 FEB66 FOX IS. | 52.400 | -169.600 | 47 | 11 58 14.2 | .0488 | .015 | 15 |
| 03 JUL66 FOX | 52.500 | -170.200 | 69 | 03 55 15.7 | .0330 | .006 | 18 |
| 30 MAR66 FOX IS. | 51.900 | -170.600 | 33 | 05 46 31.0 | .0718 | -.048 | 18 |
| 04 DEC65 FOX IS. | 51.300 | -170.600 | 18 | 02 11 49.9 | .0482 | .031 | 14 |
| 30 NOV65 FOX IS | 52.700 | -171.800 | 134 | 12 37 26.0 | .0801 | .056 | 20 |
| 07 AUG 66 ALEUT. IS. | 50.600 | -171.300 | 49 | 02 13 05.1 | .0533 | -.007 | 17 |

11 15 67 RELATIVE TRAVEL-TIME ANOMALIES

HERRIN(68)TRAVEL-TIME TABLES REFERENCE STATION AB

INCLUDING ELLIPTICITY

ANOMALY REGION = HAI - NEAR IS
DISTANCE RANGE = 5263 TO 5689 KM AZIMUTH RANGE = 304.2 TO 310.2 DEGREES

| | EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 29 | OCT65 AMCHITKA | 5242.58 | 304.40 | 0 | 0 | 0 | 0 | .151 | .090 | .013 | -.023 | -.046 | 0 |
| 06 | DEC65 RAT IS. | 5396.00 | 304.25 | 0 | 0 | 0 | 0 | .140 | 0 | -.026 | -.035 | .025 | 0 |
| 11 | NOV65 RAT IS | 5416.22 | 304.01 | 0 | 0 | 0 | 0 | .026 | .024 | 0 | -.045 | 0 | -.133 |
| 13 | MAY66 RAT IS | 5451.36 | 305.18 | .100 | .088 | -.063 | -.080 | .099 | .095 | -.057 | -.132 | .200 | -.008 |
| 02 | JUN66 RAT IS | 5458.79 | 305.37 | 0 | .098 | -.065 | -.049 | .063 | .048 | 0 | -.163 | .137 | -.188 |
| 26 | MAR66 RAT IS | 5475.22 | 305.18 | .051 | .059 | .036 | -.031 | .088 | 0 | -.066 | -.084 | .062 | -.094 |
| 26 | FEB66 NEAR IS | 5540.02 | 307.79 | -.031 | .054 | -.127 | -.115 | -.088 | 0 | -.120 | -.138 | -.114 | -.155 |
| 08 | APR66 NEAR IS. | 5551.21 | 307.72 | .098 | 0 | -.126 | -.059 | .010 | -.002 | .012 | -.098 | -.067 | -.003 |
| 05 | DEC65 NEAR IS. | 5553.89 | 308.17 | 0 | 0 | 0 | .038 | .100 | .032 | -.045 | .020 | -.021 | -.057 |
| 11 | APR66 NEAR IS | 5571.09 | 308.13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 24 | FEB66 NEAR IS | 5595.94 | 308.43 | -.051 | 0 | -.103 | -.062 | .004 | .009 | -.046 | -.165 | -.059 | .020 |
| 13 | JAN66 NEAR IS. | 5610.18 | 308.96 | .000 | .065 | -.028 | -.008 | .115 | -.007 | -.054 | .015 | -.092 | -.156 |
| 17 | NOV65 NEAR IS | 5611.62 | 308.09 | 0 | 0 | 0 | 0 | .187 | 0 | 0 | -.123 | -.131 | -.158 |
| 23 | DEC65 NEAR IS. | 5614.67 | 308.70 | 0 | 0 | 0 | -.011 | .089 | -.007 | .001 | -.087 | -.049 | -.100 |
| 16 | JAN66 NEAR IS. | 5616.13 | 309.00 | -.053 | -.125 | -.138 | -.108 | -.044 | -.116 | -.064 | -.126 | -.100 | -.215 |
| 02 | MAR66 NEAR IS | 5618.40 | 308.28 | -.013 | -.023 | -.082 | -.104 | .020 | -.022 | -.094 | -.144 | -.074 | -.208 |
| 08 | JUN66 NEAR | 5653.05 | 309.52 | -.035 | .026 | -.093 | -.086 | -.104 | -.158 | -.019 | -.101 | -.110 | 0 |
| 14 | JUL66 NEAR | 5653.05 | 309.52 | -.005 | .086 | -.103 | -.056 | .085 | -.047 | -.029 | -.061 | -.120 | -.053 |
| 10 | APR66 NEAR IS | 5658.95 | 309.56 | .035 | .076 | .026 | -.026 | .036 | .013 | .050 | -.101 | -.068 | -.063 |
| 01 | DEC65 NEAR IS. | 5662.25 | 307.67 | 0 | 0 | 0 | .050 | 0 | .015 | .006 | -.045 | .008 | -.038 |
| 08 | MAR66 NEAR IS | 5684.17 | 310.16 | -.066 | .046 | -.019 | -.053 | -.002 | .001 | -.007 | -.056 | -.157 | -.093 |
| 14 | NOV65 NEAR IS A | 5689.50 | 310.04 | 0 | 0 | 0 | -.004 | .065 | -.019 | .035 | -.046 | 0 | -.100 |
| | | AVERAGE | | .009 | .043 | -.048 | -.048 | .052 | -.003 | -.028 | -.082 | -.041 | -.100 |
| | | SIGMA | | .057 | .065 | .057 | .055 | .074 | .043 | .044 | .054 | .093 | .071 |
| | | N | | 12 | 11 | 13 | 17 | 20 | 17 | 18 | 21 | 19 | 18 |

| | EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 29 | OCT65 AMCHITKA | 5242.58 | 304.40 | -.126 | 0 | 0 | -.003 | -.356 | -.154 | -.248 | -.524 | -.273 | -.272 |
| 06 | DEC65 RAT IS. | 5396.00 | 304.25 | -.144 | -.031 | -.075 | -.093 | -.434 | -.146 | -.307 | -.557 | -.337 | -.305 |
| 11 | NOV65 RAT IS | 5416.22 | 304.01 | -.127 | .023 | -.076 | .029 | -.407 | -.046 | -.302 | -.597 | -.359 | -.346 |
| 13 | MAY66 RAT IS | 5451.36 | 305.18 | -.123 | -.091 | .026 | 0 | -.346 | 0 | 0 | -.399 | -.375 | -.433 |
| 02 | JUN66 RAT IS | 5458.79 | 305.37 | -.059 | -.109 | -.134 | -.159 | -.424 | -.217 | 0 | -.541 | -.289 | -.502 |
| 26 | MAR66 RAT IS | 5475.22 | 305.18 | -.114 | -.046 | -.108 | -.027 | -.400 | -.147 | 0 | -.532 | -.255 | -.310 |
| 26 | FEB66 NEAR IS | 5540.02 | 307.79 | -.182 | -.099 | -.230 | -.058 | -.454 | -.245 | -.242 | -.491 | -.440 | -.394 |
| 08 | APR66 NEAR IS. | 5551.21 | 307.72 | -.170 | -.101 | -.245 | -.028 | -.388 | -.194 | 0 | -.484 | -.340 | -.421 |
| 05 | DEC65 NEAR IS. | 5553.89 | 308.17 | -.114 | .027 | -.178 | -.045 | -.397 | -.178 | -.232 | -.503 | -.346 | -.332 |
| 11 | APR66 NEAR IS | 5571.09 | 308.13 | 0 | 0 | -.142 | -.012 | -.202 | -.100 | 0 | -.304 | -.231 | -.331 |
| 24 | FEB66 NEAR IS | 5595.94 | 308.43 | 0 | -.057 | -.170 | .004 | -.382 | -.232 | -.394 | -.509 | -.368 | -.406 |
| 13 | JAN66 NEAR IS. | 5610.18 | 308.96 | -.138 | -.066 | -.087 | -.055 | -.318 | -.114 | -.377 | -.608 | 0 | -.248 |
| 17 | NOV65 NEAR IS | 5611.62 | 308.09 | -.123 | .058 | -.100 | -.087 | -.392 | -.150 | -.348 | -.449 | -.216 | 0 |
| 23 | DEC65 NEAR IS. | 5614.67 | 308.70 | -.131 | -.075 | -.107 | .099 | -.365 | -.215 | -.258 | -.429 | -.310 | -.358 |
| 16 | JAN66 NEAR IS. | 5616.13 | 309.00 | -.199 | -.027 | -.246 | -.160 | -.448 | -.249 | -.201 | -.462 | 0 | -.443 |
| 02 | MAR66 NEAR IS | 5618.40 | 308.28 | -.179 | -.091 | -.120 | .022 | -.332 | -.158 | -.272 | -.560 | -.319 | -.474 |
| 08 | JUN66 NEAR | 5653.05 | 309.52 | -.265 | -.113 | -.203 | -.011 | -.373 | -.215 | -.341 | -.559 | -.271 | -.333 |
| 14 | JUL66 NEAR | 5653.05 | 309.52 | -.106 | .056 | -.111 | -.119 | 0 | -.154 | -.231 | -.449 | 0 | -.456 |
| 10 | APR66 NEAR IS | 5658.95 | 309.56 | -.107 | -.094 | -.179 | -.018 | -.284 | -.167 | -.336 | -.430 | -.295 | -.385 |
| 01 | DEC65 NEAR IS. | 5662.25 | 307.67 | -.133 | .022 | -.170 | 0 | 0 | -.150 | -.245 | -.435 | -.365 | -.286 |
| 08 | MAR66 NEAR IS | 5684.17 | 310.16 | 0 | .002 | -.138 | -.070 | 0 | -.033 | 0 | -.404 | 0 | -.319 |
| 14 | NOV65 NEAR IS A | 5689.50 | 310.04 | 0 | -.012 | -.136 | -.011 | 0 | -.073 | 0 | 0 | 0 | -.389 |
| | | AVERAGE | | -.141 | -.041 | -.139 | -.039 | -.373 | -.160 | -.293 | -.490 | -.317 | -.368 |
| | | SIGMA | | .045 | .057 | .064 | .064 | .062 | .059 | .059 | .065 | .058 | .069 |
| | | N | | 18 | 20 | 21 | 20 | 18 | 21 | 15 | 21 | 17 | 21 |

E V E N T P A R A M E T E R S

| | 22 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | ND. STA |
|---|---|---|---|---|---|---|---|---|
| 29 | OCT65 AMCHITKA | 51.438 | 179.183 | 0 | 21 00 00.1 | .0565 | .038 | 13 |
| 06 | DEC65 RAT IS. | 50.600 | 177.400 | 37 | 01 22 36.0 | .0513 | .010 | 14 |
| 11 | NOV65 RAT IS | 51.700 | 176.200 | 10 | 02 21 24.4 | .0558 | .010 | 14 |
| 13 | MAY66 RAT IS | 51.000 | 176.200 | 33 | 07 54 42.0 | .0939 | .038 | 17 |
| 02 | JUN66 RAT IS | 51.100 | 176.000 | 41 | 03 27 53.3 | .0810 | -.014 | 17 |
| 26 | MAR66 RAT IS | 50.900 | 175.900 | 44 | 13 16 48.0 | .0478 | .023 | 18 |
| 26 | FEB66 NEAR IS | 52.400 | 173.600 | 51 | 00 33 50.1 | .0718 | -.056 | 19 |
| 08 | APR66 NEAR IS. | 52.300 | 173.500 | 45 | 23 46 50.8 | .0524 | -.012 | 18 |
| 05 | DEC65 NEAR IS. | 52.600 | 173.200 | 36 | 18 14 50.2 | .0486 | .022 | 17 |
| 11 | APR66 NEAR IS | 52.500 | 173.000 | 29 | 16 05 41.8 | .0943 | .069 | 7 |
| 24 | FEB66 NEAR IS | 52.000 | 172.500 | 65 | 05 40 06.8 | .0551 | -.024 | 10 |
| 13 | JAN66 NEAR IS. | 52.900 | 172.000 | 14 | 10 41 11.0 | .0617 | .010 | 19 |
| 17 | NOV65 NEAR IS | 52.300 | 172.500 | 33 | 16 41 47.0 | .0712 | .010 | 13 |
| 23 | DEC65 NEAR IS. | 52.700 | 172.100 | 64 | 01 59 22.0 | .0457 | .019 | 17 |
| 16 | JAN66 NEAR IS. | 52.900 | 171.900 | 25 | 09 11 50.0 | .0914 | -.067 | 19 |
| 02 | MAR66 NEAR IS | 52.400 | 172.300 | 40 | 11 51 20.7 | .0544 | -.030 | 20 |
| 08 | JUN66 NEAR | 53.100 | 171.100 | 20 | 19 56 21.3 | .0735 | -.044 | 19 |
| 14 | JUL66 NEAR | 53.100 | 171.100 | 29 | 18 07 04.1 | .0523 | .004 | 10 |
| 10 | APR66 NEAR IS | 53.100 | 171.000 | 20 | 10 39 51.0 | .0462 | .017 | 20 |
| 01 | DEC65 NEAR IS. | 51.800 | 172.100 | 33 | 07 26 25.0 | .0542 | .035 | 14 |
| 08 | MAR66 NEAR IS | 53.400 | 170.300 | 18 | 23 26 40.0 | .0595 | .009 | 16 |
| 14 | NOV65 NEAR IS A | 53.300 | 170.300 | 33 | 13 28 33.0 | .0437 | .028 | 11 |

11 ,5 67 RELATIVE TRAVEL-TIME ANOMALIES

HERRIN68TRAVEL-TIME TABLES REFERENCE STATION A0

INCLUDING ELLIPTICITY

ANOMALY REGION = KAMCHATKA -KOMANDORSKY
DISTANCE RANGE = 5836 TO 6570 KM AZIMUTH RANGE = 312.9 TO 315.7 DEGREES

| | EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 19 | JUL66 KOMANDORSKY | 5835.96 | 315.21 | .007 | .054 | .065 | -.047 | -.035 | -.162 | .076 | -.040 | -.156 | -.119 |
| 16 | JAN66 KOMANDORSKY | 5859.05 | 313.47 | -.057 | -.092 | -.050 | -.018 | .019 | 0 | .018 | -.102 | 0 | 0 |
| 20 | MAY66 KOMANDORSKY | 5859.61 | 314.41 | 0 | .088 | -.002 | -.068 | -.028 | -.018 | .067 | -.044 | -.179 | -.123 |
| 21 | FEB66 C KAMCHATKA | 5977.82 | 315.28 | -.080 | .111 | -.018 | -.053 | -.030 | 0 | .082 | -.040 | -.188 | -.163 |
| 25 | NOV65 KAMCHATKA | 5995.71 | 314.82 | -.130 | .102 | .006 | -.046 | -.059 | -.124 | .128 | -.019 | -.183 | -.108 |
| 22 | OCT 66 KAMCHATKA | 6049.63 | 315.19 | -.170 | .165 | .011 | -.067 | .015 | -.265 | .267 | .054 | -.238 | 0 |
| 28 | JAN 67 KAMCHATKA | 6156.60 | 315.67 | -.252 | .170 | .145 | -.001 | -.051 | -.149 | .127 | .052 | -.204 | -.109 |
| 18 | NOV65 KAMCHATKA | 6199.32 | 314.36 | 0 | 0 | 0 | 0 | 0 | 0 | .022 | -.110 | -.201 | 0 |
| 20 | FEB66 KAMCHATKA | 6298.88 | 313.93 | -.154 | .057 | .018 | .005 | -.048 | 0 | .082 | .003 | -.221 | -.138 |
| 22 | DEC65 C KAMCHATKA | 6304.35 | 312.95 | 0 | 0 | 0 | -.070 | 0 | 0 | .063 | -.051 | 0 | -.156 |
| 23 | SEP66 KAMCHATKA | 6317.11 | 313.77 | -.136 | .088 | .008 | -.027 | -.033 | -.070 | .085 | -.008 | -.265 | -.142 |
| 07 | JAN66 C KAMCHATKA | 6319.57 | 312.36 | -.051 | 0 | -.008 | -.060 | -.051 | -.043 | .041 | -.037 | -.258 | -.168 |
| 19 | APR66 F KAMCHATKA | 6320.39 | 314.14 | -.191 | -.112 | -.045 | 0 | -.066 | -.175 | .081 | -.020 | -.322 | 0 |
| 05 | FEB66 KAMCHATKA C | 6373.15 | 314.05 | -.142 | -.010 | -.005 | -.077 | 0 | 0 | 0 | -.002 | -.274 | -.187 |
| 21 | DEC65 KAMCHATKA | 6380.08 | 313.86 | 0 | 0 | 0 | 0 | 0 | 0 | -.013 | 0 | -.219 | -.242 |
| 23 | AUG66 E CST KAMCH | 6520.39 | 313.87 | -.042 | .058 | .024 | -.046 | .021 | -.011 | .074 | -.035 | 0 | -.158 |
| 08 | APR66 KAMCHATKA 2 | 6533.71 | 312.95 | -.194 | .068 | .061 | -.041 | -.066 | -.112 | 0 | -.009 | -.213 | -.187 |
| 08 | APR66 KAMCHATKA 1 | 6539.31 | 313.00 | -.153 | -.061 | -.109 | -.071 | -.145 | -.221 | -.017 | -.119 | -.241 | -.197 |
| 28 | JAN66 KAMCHATKA C | 6551.51 | 313.68 | -.224 | -.070 | -.075 | -.199 | -.134 | -.061 | -.023 | -.026 | -.247 | -.222 |
| 22 | JAN66 KAMCHATKA | 6570.50 | 313.54 | -.145 | .042 | .085 | -.001 | -.058 | -.102 | .151 | -.008 | 0 | 0 |
| | AVERAGE | | | -.136 | .041 | .003 | -.052 | -.048 | -.116 | .068 | -.030 | -.229 | -.161 |
| | SIGMA | | | .071 | .087 | .059 | .046 | .049 | .078 | .071 | .048 | .045 | .040 |
| | N | | | 16 | 16 | 17 | 17 | 16 | 13 | 18 | 19 | 16 | 15 |

| | EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 19 | JUL66 KOMANDORSKY | 5835.96 | 315.21 | -.074 | .022 | -.159 | -.119 | -.209 | -.040 | 0 | -.392 | .009 | -.316 |
| 16 | JAN66 KOMANDORSKY | 5859.05 | 313.47 | -.254 | -.065 | -.247 | -.146 | -.286 | -.111 | -.286 | -.536 | -.181 | -.407 |
| 20 | MAY66 KOMANDORSKY | 5859.01 | 314.41 | -.149 | -.056 | -.232 | -.105 | -.271 | -.111 | 0 | -.421 | -.148 | -.323 |
| 21 | FEB66 C KAMCHATKA | 5977.82 | 315.28 | -.109 | 0 | 0 | -.094 | -.230 | -.050 | 0 | -.356 | -.049 | 0 |
| 25 | NOV65 KAMCHATKA | 5995.71 | 314.82 | 0 | .019 | -.177 | -.095 | -.241 | -.077 | 0 | -.415 | -.113 | -.206 |
| 22 | OCT 66 KAMCHATKA | 6049.63 | 315.19 | -.108 | .172 | 0 | -.157 | -.277 | -.028 | -.222 | -.412 | -.183 | -.336 |
| 28 | JAN 67 KAMCHATKA | 6156.60 | 315.67 | -.094 | .094 | -.227 | -.119 | -.212 | .039 | 0 | -.327 | -.009 | 0 |
| 18 | NOV65 KAMCHATKA | 6199.32 | 314.36 | -.167 | -.059 | 0 | 0 | -.195 | 0 | 0 | -.459 | -.178 | -.273 |
| 20 | FEB66 KAMCHATKA | 6298.88 | 313.93 | -.117 | 0 | -.274 | -.038 | -.187 | .036 | 0 | -.278 | -.051 | -.298 |
| 22 | DEC65 C KAMCHATKA | 6304.35 | 312.95 | -.069 | .005 | -.223 | -.105 | -.236 | -.057 | 0 | -.411 | -.059 | -.333 |
| 23 | SEP66 KAMCHATKA | 6317.11 | 313.77 | -.043 | .018 | -.247 | 0 | -.241 | -.007 | 0 | -.344 | -.072 | -.360 |
| 07 | JAN66 C KAMCHATKA | 6319.57 | 312.36 | -.082 | .030 | -.232 | -.048 | -.305 | -.107 | 0 | -.343 | -.103 | 0 |
| 19 | APR66 F KAMCHATKA | 6320.39 | 314.14 | 0 | -.218 | -.269 | 0 | -.349 | -.091 | 0 | -.390 | -.193 | -.445 |
| 05 | FEB66 KAMCHATKA C | 6373.15 | 314.05 | -.132 | -.025 | -.259 | -.065 | -.207 | -.078 | -.293 | -.327 | -.331 | -.437 |
| 21 | DEC65 KAMCHATKA | 6380.08 | 313.86 | -.077 | .048 | -.314 | -.232 | -.341 | -.048 | 0 | 0 | -.077 | -.327 |
| 23 | AUG66 E CST KAMCH | 6520.39 | 313.87 | -.081 | .042 | -.268 | -.105 | -.229 | -.040 | -.268 | -.374 | -.071 | -.366 |
| 08 | APR66 KAMCHATKA 2 | 6533.71 | 312.95 | -.035 | .013 | -.332 | -.104 | -.264 | -.063 | -.357 | -.402 | -.118 | -.355 |
| 08 | APR66 KAMCHATKA 1 | 6539.31 | 313.00 | -.147 | -.087 | -.330 | -.130 | -.315 | -.106 | -.392 | -.440 | -.203 | -.357 |
| 28 | JAN66 KAMCHATKA C | 6551.51 | 313.68 | -.156 | -.048 | -.313 | -.101 | -.272 | -.071 | -.289 | -.401 | -.198 | -.397 |
| 22 | JAN66 KAMCHATKA | 6570.50 | 313.54 | 0 | 0 | -.267 | -.061 | -.176 | .033 | -.285 | -.423 | -.180 | -.275 |
| | AVERAGE | | | -.111 | -.006 | -.257 | -.107 | -.252 | -.053 | -.286 | -.392 | -.124 | -.343 |
| | SIGMA | | | .053 | .084 | .048 | .045 | .050 | .049 | .063 | .057 | .081 | .053 |
| | N | | | 17 | 17 | 17 | 17 | 20 | 19 | 8 | 19 | 20 | 17 |

E V E N T P A R A M E T E R S

| 20 | EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|---|
| 19 | JUL66 KOMANDORSKY | 56.200 | 164.900 | 18 | 01 40 53.9 | .0605 | .035 | 19 |
| 16 | JAN66 KOMANDORSKY | 54.900 | 165.800 | 15 | 19 44 39.5 | .0785 | .041 | 17 |
| 20 | MAY66 KOMANDORSKY | 55.000 | 165.700 | 46 | 11 44 29.0 | .0397 | .003 | 18 |
| 21 | FEB66 C KAMCHATKA | 55.800 | 162.900 | 33 | 14 14 29.6 | .0379 | .022 | 15 |
| 25 | NOV65 KAMCHATKA | 55.200 | 163.000 | 33 | 03 35 11.7 | .0378 | .020 | 18 |
| 22 | OCT 66 KAMCHATKA | 55.200 | 162.000 | 59 | 12 47 18.2 | .0877 | .023 | 18 |
| 28 | JAN 67 KAMCHATKA | 55.000 | 160.200 | 113 | 22 28 01.2 | .0794 | .048 | 18 |
| 18 | NOV65 KAMCHATKA | 53.900 | 160.700 | 12 | 21 38 12.4 | .0640 | .031 | 9 |
| 20 | FEB66 KAMCHATKA | 53.100 | 159.800 | 44 | 05 58 09.6 | .0524 | .034 | 17 |
| 22 | DEC65 C KAMCHATKA | 52.400 | 160.500 | 5 | 00 28 46.2 | .0272 | .009 | 13 |
| 23 | SEP66 KAMCHATKA | 52.900 | 159.700 | 68 | 02 07 02.4 | .0347 | .022 | 18 |
| 07 | JAN66 C KAMCHATKA | 52.600 | 160.000 | 92 | 07 45 27.3 | .0435 | .011 | 17 |
| 19 | APR66 F KAMCHATKA | 54.100 | 159.300 | 62 | 20 26 12.5 | .0916 | .088 | 15 |
| 05 | FEB66 KAMCHATKA C | 52.500 | 158.800 | 44 | 14 24 15.0 | .0851 | .021 | 17 |
| 21 | DEC65 KAMCHATKA | 52.600 | 158.800 | 67 | 00 32 00.7 | .0683 | .026 | 11 |
| 23 | AUG66 E CST KAMCH | 51.900 | 157.200 | 186 | 15 02 55.0 | .0433 | .029 | 19 |
| 08 | APR66 KAMCHATKA 2 | 51.200 | 157.800 | 4M | 05 24 44.6 | .0362 | .006 | 19 |
| 08 | APR66 KAMCHATKA 1 | 51.200 | 157.700 | 47 | 01 46 44.9 | .0746 | .064 | 20 |
| 28 | JAN66 KAMCHATKA C | 51.600 | 157.000 | 107 | 22 38 12.2 | .0677 | .047 | 20 |
| 22 | JAN66 KAMCHATKA | 51.400 | 156.900 | 151 | 18 31 01.0 | .0563 | .030 | 16 |

11 15 67

# R E L A T I V E  T R A V E L - T I M E  A N O M A L I E S

HERRIN68 TRAVEL-TIME TABLES  REFERENCE STATION  A0

INCLUDING ELLIPTICITY

ANOMALY REGION = KURILE IS AND SEA OF OKHOTSK NORTHERN GROUP
DISTANCE RANGE = 6486 TO 7051 KM  AZIMUTH RANGE = 311.4 TO 316.0 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21 JUN66 KURILE | 6607.52 | 311.93 | -.056 | .122 | .089 | -.039 | .003 | -.868 | .118 | .042 | -.133 | -.134 |
| 08 APR66 KURILE | 6435.80 | 312.89 | -.052 | .166 | .019 | -.029 | -.043 | -.069 | .112 | .029 | -.157 | 0 |
| 20 DEC65 KURILE IS | 6655.05 | 312.75 | 0 | 0 | 0 | 0 | -.023 | -.016 | 0 | .044 | -.194 | -.200 |
| 11 DEC65 KURILE IS | 6720.84 | 313.43 | 0 | 0 | 0 | -.007 | -.044 | -.051 | .077 | .004 | -.188 | -.197 |
| 24 OCT65 KURILE IS | 6731.35 | 313.34 | -.039 | -.013 | -.077 | -.022 | -.103 | -.834 | .048 | .071 | -.174 | 0 |
| 05 FEB66 KURILE IS | 6752.82 | 313.26 | -.147 | -.092 | -.025 | -.059 | .012 | -.121 | -.000 | -.057 | -.113 | -.203 |
| 22 OCT65 NW OF KURIL | 6756.90 | 315.37 | 0 | 0 | 0 | 0 | -.087 | 0 | .044 | 0 | 8 | 8 |
| 05 NOV65 KURILE IS A | 6805.80 | 312.22 | 0 | 0 | 0 | 0 | -.003 | 0 | 0 | .037 | 0 | 8 |
| 07 NOV65 KURILE IS | 6855.25 | 312.28 | 0 | 0 | 0 | -.033 | -.028 | -.007 | .024 | -.046 | -.224 | -.170 |
| 21 NOV65 KURILE IS | 6902.05 | 311.85 | 0 | 0 | 0 | 0 | -.047 | 0 | -.020 | .032 | -.213 | -.262 |
| 11 FEB67 KURILE IS | 6910.55 | 311.43 | -.086 | .065 | .056 | -.043 | -.052 | -.079 | .013 | .013 | -.149 | -.240 |
| 20 FEB66 KURILE | 6913.31 | 311.36 | -.169 | .025 | -.083 | -.124 | .093 | 0 | -.034 | -.016 | -.197 | -.238 |
| 03 MAR66 KURILE | 6931.96 | 311.96 | -.211 | .105 | .042 | -.098 | .104 | .026 | .100 | .130 | -.228 | -.258 |
| 12 DEC65 OKHOTSK | 7050.80 | 315.97 | 0 | 0 | 0 | 0 | -.088 | -.088 | .081 | -.012 | -.221 | 0 |
| | AVERAGE | | -.108 | .054 | .003 | -.021 | -.022 | -.051 | .047 | .021 | -.183 | -.218 |
| | SIGMA | | .067 | .088 | .066 | .062 | .061 | .044 | .051 | .049 | .038 | .048 |
| | N | | 7 | 7 | 7 | 9 | 14 | 10 | 12 | 13 | 12 | 9 |

| EVENT NAME | DISTANCE | AZIMUTH | G3 | G4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21 JUN66 KURILE | 6607.52 | 311.93 | -.129 | .220 | -.193 | -.053 | -.247 | -.005 | -.285 | -.403 | -.171 | -.312 |
| 08 APR66 KURILE | 6435.80 | 312.89 | -.026 | .032 | -.263 | -.051 | -.304 | .041 | -.247 | -.425 | -.174 | -.348 |
| 20 DEC65 KURILE IS | 6655.05 | 312.75 | -.102 | .092 | -.279 | -.061 | 0 | .055 | -.286 | 0 | -.191 | -.292 |
| 11 DEC65 KURILE IS | 6720.84 | 313.43 | -.073 | .064 | -.320 | -.043 | -.296 | .005 | 0 | -.472 | -.142 | -.244 |
| 24 OCT65 KURILE IS | 6731.35 | 313.34 | -.063 | .055 | -.261 | -.089 | -.315 | -.079 | -.280 | -.363 | -.213 | -.142 |
| 05 FEB66 KURILE IS | 6752.82 | 313.26 | -.109 | .088 | -.173 | -.041 | -.272 | .025 | -.121 | -.535 | -.242 | -.220 |
| 22 OCT65 NW OF KURIL | 6758.90 | 315.37 | 0 | .024 | -.277 | -.136 | 0 | .139 | -.354 | -.524 | -.213 | -.287 |
| 05 NOV65 KURILE IS A | 6805.80 | 312.22 | 0 | 0 | 0 | -.051 | 0 | .105 | 0 | 0 | -.207 | -.213 |
| 07 NOV65 KURILE IS | 6855.25 | 312.28 | -.062 | .125 | -.214 | -.054 | -.315 | 0 | 0 | -.274 | -.283 | -.228 |
| 21 NOV65 KURILE IS | 6902.05 | 311.85 | -.134 | .093 | -.188 | -.130 | -.289 | .075 | 0 | -.461 | -.284 | -.169 |
| 11 FEB67 KURILE IS | 6910.55 | 311.43 | -.099 | .200 | -.180 | -.105 | -.396 | 0 | -.273 | -.432 | -.200 | -.197 |
| 20 FEB66 KURILE | 6913.31 | 311.36 | -.072 | 0 | -.314 | -.131 | 0 | .017 | 0 | -.591 | -.200 | -.297 |
| 03 MAR66 KURILE | 6931.96 | 311.96 | -.086 | .160 | -.287 | -.065 | -.358 | .113 | -.194 | -.525 | -.075 | -.084 |
| 12 DEC65 OKHOTSK | 7050.80 | 315.97 | -.098 | .032 | -.197 | -.163 | -.319 | 0 | -.282 | -.415 | -.236 | -.168 |
| | AVERAGE | | -.086 | .100 | -.242 | -.069 | -.311 | .059 | -.262 | -.452 | -.206 | -.222 |
| | SIGMA | | .030 | .065 | .053 | .064 | .042 | .047 | .067 | .086 | .056 | .069 |
| | N | | 12 | 12 | 13 | 14 | 10 | 11 | 9 | 12 | 14 | 14 |

## E V E N T  P A R A M E T E R S

| 14 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 21 JUN66 KURILE | 50.100 | 157.800 | 14 | 23 05 25.9 | .0667 | .032 | 20 |
| 08 APR66 KURILE | 50.600 | 156.700 | 200 | 23 09 36.0 | .0515 | .007 | 19 |
| 20 DEC65 KURILE IS | 50.400 | 156.600 | 33 | 07 12 33.7 | .0285 | -.005 | 13 |
| 11 DEC65 KURILE IS | 50.500 | 155.300 | 110 | 12 16 59.9 | .0375 | -.001 | 16 |
| 24 OCT65 KURILE IS | 49.700 | 156.100 | 30 | 18 15 04.9 | .0493 | .001 | 19 |
| 05 FEB66 KURILE IS | 50.200 | 155.100 | 98 | 16 16 01.0 | .0654 | -.012 | 20 |
| 22 OCT65 NW OF KURIL | 51.600 | 153.200 | 480 | 07 45 26.0 | .0637 | -.035 | 10 |
| 05 NOV65 KURILE IS A | 49.200 | 155.400 | 33 | 03 03 22.0 | .0583 | .034 | 6 |
| 07 NOV65 KURILE IS | 48.900 | 154.900 | 33 | 14 12 38.0 | .0605 | .008 | 15 |
| 21 NOV65 KURILE IS | 48.400 | 154.700 | 33 | 06 18 56.8 | .0452 | -.015 | 14 |
| 11 FEB67 KURILE IS | 46.200 | 154.800 | 26 | 14 33 06.3 | .0454 | -.002 | 19 |
| 20 FEB66 KURILE | 48.000 | 155.000 | 33 | 18 15 50.0 | .0712 | -.040 | 16 |
| 03 MAR66 KURILE | 46.300 | 154.300 | 45 | 03 25 28.0 | .0815 | -.034 | 20 |
| 12 DEC65 OKHOTSK | 50.300 | 149.500 | 438 | 19 25 09.1 | .0486 | -.017 | 14 |

11 15 07

# RELATIVE TRAVEL-TIME ANOMALIES

HERRIN66TRAVEL-TIME TABLES — REFERENCE STATION A0

INCLUDING ELLIPTICITY

ANOMALY REGION • KURILE IS SOUTHERN GROUP
DISTANCE RANGE • 7210 TO 7678 KM AZIMUTH RANGE • 311.1 TO 313.4 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 FEB60 KURILE | 7210.35 | 312.77 | 0 | .086 | .040 | -.071 | .087 | 0 | .113 | .064 | 0 | -.163 |
| 10 NOV65 KURILE IS | 7247.35 | 311.17 | 0 | 0 | 0 | 0 | 0 | -.112 | .054 | 0 | -.197 | 0 |
| 08 MAY60 KURILE | 7408.71 | 311.06 | -.125 | .015 | .001 | -.104 | .034 | -.110 | .037 | -.037 | -.179 | 0 |
| 13 DEC65 KURILE IS | 7433.29 | 311.06 | 0 | 0 | 0 | -.024 | 0 | -.054 | .198 | 6 | 6 | 0 |
| 22 JUN60 KURILE | 7436.97 | 312.15 | 0 | .025 | .032 | -.030 | 0 | -.110 | .007 | -.004 | -.131 | -.170 |
| 18 DEC65 KURILE IS | 7450.54 | 311.22 | 0 | 0 | 0 | 0 | -.075 | -.124 | -.093 | -.081 | -.188 | -.263 |
| 24 OCT65 KURILE IS | 7461.06 | 311.78 | 0 | -.023 | 0 | 0 | -.116 | 0 | 0 | -.184 | -.141 | 0 |
| 30 DEC65 KURILE IS | 7569.45 | 311.50 | 0 | 0 | 0 | -.129 | 0 | 0 | 0 | .009 | -.221 | -.169 |
| 20 NOV65 KURILE IS | 7612.04 | 313.36 | -.064 | .003 | .040 | -.023 | -.020 | -.007 | .003 | .046 | -.116 | -.109 |
| 09 APR60 KURILE | 7630.74 | 311.87 | -.002 | .003 | .051 | -.009 | -.089 | -.074 | .017 | -.019 | -.161 | -.190 |
| 12 JAN66 KURILE IS | 7634.29 | 312.05 | -.120 | .023 | .000 | -.096 | -.090 | -.082 | .095 | .034 | -.185 | -.194 |
| 19 FEB00 KURILE | 7678.40 | 312.17 | -.077 | .006 | -.003 | -.101 | -.067 | 0 | .007 | -.022 | -.136 | -.199 |
| AVERAGE | | | -.069 | .033 | .023 | -.070 | -.044 | -.004 | .050 | -.003 | -.149 | -.190 |
| SIGMA | | | .020 | .037 | .023 | .050 | .071 | .027 | .045 | .047 | .035 | .041 |
| N | | | 5 | 8 | 7 | 9 | 6 | 6 | 10 | 10 | 10 | 8 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 FEB60 KURILE | 7210.35 | 312.77 | -.096 | .808 | -.310 | -.074 | -.269 | .084 | -.216 | -.466 | -.170 | -.241 |
| 10 NOV65 KURILE IS | 7247.35 | 311.17 | -.090 | .060 | -.200 | -.074 | 0 | .109 | -.309 | -.516 | -.291 | -.276 |
| 08 MAY60 KURILE | 7408.71 | 311.06 | 0 | .179 | -.233 | -.136 | 0 | .108 | -.307 | -.531 | -.200 | -.160 |
| 13 DEC65 KURILE IS | 7433.29 | 311.06 | -.107 | .104 | 0 | -.076 | 0 | .140 | 0 | -.514 | -.318 | -.136 |
| 22 JUN60 KURILE | 7436.07 | 312.15 | -.114 | .147 | -.100 | -.003 | -.386 | 0 | -.226 | -.488 | -.186 | -.202 |
| 18 DEC65 KURILE IS | 7450.54 | 311.22 | -.132 | .103 | -.102 | -.085 | -.377 | .111 | -.277 | -.529 | -.304 | -.141 |
| 24 OCT65 KURILE IS | 7461.06 | 311.78 | 0 | 0 | -.316 | -.143 | 0 | .049 | -.289 | -.403 | -.312 | -.194 |
| 30 DEC65 KURILE IS | 7569.45 | 311.50 | -.024 | .107 | -.123 | -.107 | -.438 | .057 | -.230 | -.441 | -.368 | -.302 |
| 20 NOV65 KURILE IS | 7612.04 | 313.30 | -.069 | .065 | -.103 | -.083 | -.299 | .142 | -.216 | 0 | 0 | -.078 |
| 09 APR66 KURILE | 7630.74 | 311.87 | -.002 | .104 | -.230 | -.033 | -.435 | .006 | -.137 | -.463 | -.228 | -.167 |
| 12 JAN66 KURILE IS | 7634.20 | 312.05 | -.037 | 0 | -.308 | -.057 | -.294 | .001 | -.196 | -.425 | -.269 | -.199 |
| 19 FEB66 KURILE | 7678.40 | 312.17 | -.002 | 0 | -.214 | -.006 | -.254 | .097 | -.200 | -.379 | -.269 | -.174 |
| AVERAGE | | | -.003 | .111 | -.219 | -.080 | -.343 | .097 | -.239 | -.479 | -.263 | -.178 |
| SIGMA | | | .034 | .033 | .073 | .056 | .073 | .036 | .061 | .047 | .003 | .002 |
| N | | | 10 | 8 | 11 | 12 | 8 | 11 | 11 | 11 | 11 | 12 |

## EVENT PARAMETERS

| 12 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 10 FEB66 KURILE | 47.200 | 150.800 | 168 | 20 13 33.0 | .0611 | .821 | 17 |
| 10 NOV65 KURILE IS | 45.300 | 150.000 | 33 | 07 14 13.2 | .0425 | -.805 | 12 |
| 08 MAY00 KURILE | 44.000 | 150.500 | 33 | 08 20 97.0 | .0426 | -.013 | 17 |
| 13 DEC65 KURILE IS | 44.700 | 150.200 | 33 | 14 46 10.2 | .0522 | .017 | 18 |
| 22 JUN06 KURILE | 49.400 | 140.200 | 33 | 18 90 25.6 | .0334 | .006 | 17 |
| 18 DEC65 KURILE IS | 44.700 | 140.000 | 33 | 08 30 45.8 | .0413 | -.024 | 16 |
| 24 OCT65 KURILE IS | 45.000 | 140.300 | 48 | 18 49 38.3 | .0037 | -.048 | 11 |
| 30 DEC65 KURILE IS | 44.200 | 146.500 | 70 | 14 56 56.2 | .0746 | -.027 | 14 |
| 29 NUV05 KURILE IS | 45.100 | 146.500 | 193 | 09 00 08.3 | .0519 | .033 | 18 |
| 05 APR06 KURILE | 44.000 | 147.700 | 33 | 04 97 37.0 | .0401 | .003 | 20 |
| 12 JAN66 KURILE IS | 44.100 | 147.900 | 33 | 01 38 10.3 | .0402 | .002 | 19 |
| 19 FEB66 KURILE | 43.900 | 147.000 | 98 | 22 40 55.0 | .0496 | .013 | 18 |

11 15 67 RELATIVE TRAVEL-TIME ANOMALIES

HERRIN68TRAVEL-TIME TABLES REFERENCE STATION A0

INCLUDING ELLIPTICITY

ANOMALY REGION = SAKHALIN I.-SEA OF JAPAN-HOKKAIDO
DISTANCE RANGE = 7490 TO 8272 KM AZIMUTH RANGE = 312.4 TO 316.2 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 APR 67 OKHOTSK | 7490.34 | 315.07 | -.194 | -.020 | -.042 | -.132 | -.166 | -.024 | .104 | -.129 | -.157 | -.221 |
| 02 MAR66 SAKHLIN I. | 7565.62 | 314.12 | -.120 | .034 | -.002 | -.102 | -.193 | -.105 | .088 | -.042 | -.123 | -.236 |
| 10 SEP 66 OKHOTSK | 7624.06 | 315.77 | -.184 | .007 | .010 | -.036 | -.061 | -.134 | .134 | .006 | -.141 | -.267 |
| 27 OCT65 SAKHALIN I | 7736.23 | 315.97 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .031 | 0 | 0 |
| 19 MAR66 HOKKAIDO | 7793.92 | 312.39 | -.123 | -.030 | -.006 | -.023 | -.136 | -.087 | .008 | .079 | -.158 | 0 |
| 18 FEB66 HOKKAIDO | 7863.30 | 314.62 | -.114 | -.084 | -.025 | 0 | -.057 | 0 | -.026 | -.003 | -.216 | -.213 |
| 05 MAR66 HOKKAIDO | 7985.53 | 313.55 | -.146 | -.039 | -.069 | 0 | -.197 | -.184 | 0 | -.094 | -.184 | -.199 |
| 17 JUN66 HOKKAIDO | 8029.37 | 313.38 | -.107 | .032 | -.058 | -.140 | -.141 | -.024 | -.049 | -.064 | -.147 | -.215 |
| 23 JUN66 E SEA JAPAN | 8076.67 | 314.07 | 0 | -.095 | 0 | -.053 | -.053 | -.120 | .040 | -.025 | -.118 | -.213 |
| 20 AUG 66 HOKKAIDO | 8097.59 | 315.19 | -.125 | .015 | -.063 | -.107 | -.137 | -.049 | .068 | .010 | -.133 | -.173 |
| 28 FEB66 E SEA JAPAN | 8100.96 | 314.17 | -.004 | .066 | .010 | -.064 | -.073 | 0 | .060 | .013 | -.014 | 0 |
| 20 FEB67 HOKKAIDO | 8264.58 | 313.81 | -.118 | .013 | .024 | -.120 | -.134 | -.129 | .068 | -.026 | -.194 | -.174 |
| 02 FEB67 HOKKAIDO | 8271.95 | 314.68 | -.059 | 0 | .048 | -.097 | -.051 | -.040 | .061 | -.010 | -.070 | -.205 |
| | AVERAGE | | -.118 | -.009 | -.016 | -.087 | -.117 | -.097 | .051 | -.032 | -.138 | -.212 |
| | SIGMA | | .052 | .050 | .039 | .041 | .055 | .049 | .055 | .048 | .055 | .028 |
| | N | | 11 | 11 | 11 | 10 | 12 | 10 | 11 | 13 | 12 | 10 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 APR 67 OKHOTSK | 7490.34 | 315.07 | -.121 | .041 | -.309 | -.003 | -.309 | .118 | 0 | 0 | .042 | -.225 |
| 02 MAR66 SAKHLIN I. | 7565.62 | 314.12 | -.138 | .012 | -.161 | .043 | -.282 | .104 | 0 | -.337 | -.160 | -.140 |
| 10 SEP 66 OKHOTSK | 7624.06 | 315.77 | -.160 | .061 | -.215 | -.030 | -.296 | .085 | -.027 | -.458 | -.112 | -.192 |
| 27 OCT65 SAKHALIN I | 7736.23 | 315.97 | -.056 | -.007 | -.285 | -.023 | 0 | .065 | -.224 | -.389 | -.167 | -.229 |
| 19 MAR66 HOKKAIDO | 7793.92 | 312.39 | -.119 | .054 | -.246 | -.007 | -.318 | .090 | -.222 | -.404 | -.234 | -.232 |
| 18 FEB66 HOKKAIDO | 7863.30 | 314.62 | -.126 | 0 | -.218 | .114 | -.340 | .070 | -.213 | -.280 | -.056 | -.332 |
| 05 MAR66 HOKKAIDO | 7985.53 | 313.55 | -.183 | -.019 | -.308 | -.002 | -.445 | -.038 | -.191 | -.376 | -.247 | -.375 |
| 17 JUN66 HOKKAIDO | 8029.37 | 313.38 | -.159 | .006 | -.298 | .040 | -.303 | .023 | -.147 | -.361 | -.140 | -.299 |
| 23 JUN66 E SEA JAPAN | 8076.67 | 314.07 | -.174 | -.008 | -.233 | .077 | -.307 | .039 | -.091 | -.308 | -.111 | -.317 |
| 20 AUG 66 HOKKAIDO | 8097.59 | 315.19 | -.224 | .105 | -.169 | 0 | -.310 | .058 | -.040 | -.207 | -.028 | -.365 |
| 28 FEB66 E SEA JAPAN | 8100.96 | 314.17 | -.127 | .068 | -.273 | 0 | -.225 | .029 | -.140 | -.263 | -.119 | -.361 |
| 20 FEB67 HOKKAIDO | 8264.58 | 313.81 | -.115 | -.016 | -.263 | -.008 | -.295 | .017 | -.134 | -.267 | -.129 | -.362 |
| 02 FEB67 HOKKAIDO | 8271.95 | 314.68 | -.035 | .020 | -.189 | .072 | -.271 | .038 | -.067 | -.286 | -.160 | -.354 |
| | AVERAGE | | -.134 | .026 | -.244 | .025 | -.308 | .054 | -.140 | -.327 | -.131 | -.291 |
| | SIGMA | | .050 | .039 | .051 | .047 | .051 | .042 | .074 | .071 | .066 | .078 |
| | N | | 13 | 12 | 13 | 11 | 12 | 13 | 11 | 12 | 13 | 13 |

E V E N T P A R A M E T E R S

| 13 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 7 APR 67 OKHOTSK | 47.000 | 146.000 | 296 | 19 39 13.0 | .0548 | -.003 | 18 |
| 02 MAR66 SAKHLIN I. | 47.200 | 144.300 | 356 | 13 04 15.6 | .0500 | .013 | 19 |
| 10 SEP 66 OKHOTSK | 46.600 | 144.100 | 385 | 02 17 47.7 | .0602 | .012 | 20 |
| 27 OCT65 SAKHALIN I | 46.000 | 142.900 | 230 | 22 40 17.1 | .0591 | -.009 | 10 |
| 19 MAR66 HOKKAIDO | 43.300 | 145.800 | 11 | 08 11 40.0 | .0471 | -.013 | 19 |
| 18 FEB66 HOKKAIDO | 44.300 | 143.100 | 225 | 19 02 51.5 | .0541 | -.002 | 17 |
| 05 MAR66 HOKKAIDO | 42.800 | 143.100 | 120 | 04 48 44.5 | .0714 | -.060 | 18 |
| 17 JUN66 HOKKAIDO | 42.400 | 142.900 | 67 | 08 48 33.2 | .0376 | -.021 | 20 |
| 23 JUN66 E SEA JAPAN | 43.800 | 139.900 | 218 | 05 01 42.4 | .0371 | .002 | 18 |
| 20 AUG 66 HOKKAIDO | 43.100 | 140.600 | 161 | 09 32 31.7 | .0623 | .021 | 19 |
| 28 FEB66 E SEA JAPAN | 43.700 | 139.600 | 225 | 02 02 13.6 | .0605 | .032 | 17 |
| 20 FEB67 HOKKAIDO | 41.100 | 140.600 | 161 | 00 35 22.9 | .0350 | -.006 | 20 |
| 02 FEB67 HOKKAIDO | 41.600 | 139.700 | 176 | 16 24 39.1 | .0520 | .031 | 19 |

11 15 67

# RELATIVE TRAVEL-TIME ANOMALIES

HERRIN66 TRAVEL-TIME TABLES — REFERENCE STATION A0

INCLUDING ELLIPTICITY

ANOMALY REGION = HONSHU

DISTANCE RANGE = 8392 TO 9321 KM  AZIMUTH RANGE = 305.2 TO 312.8 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 02 APR66 EAST HONSHU | 8391.V0 | 311.40 | -.134 | .029 | -.051 | -.075 | -.104 | -.144 | -.085 | -.111 | -.156 | -.225 |
| 23 JUN66 CST HONSHU | 8482.43 | 311.36 | -.104 | -.157 | -.113 | -.219 | -.038 | -.067 | -.041 | -.258 | 0 | 0 |
| 09 MAY66 HONSHU | 8564.86 | 312.79 | -.176 | -.025 | -.044 | -.135 | -.188 | -.119 | -.072 | -.119 | -.181 | -.264 |
| 14 MAR66 HONSHU | 8589.49 | 311.00 | -.094 | -.001 | -.013 | -.096 | -.047 | 0 | -.053 | -.116 | -.136 | -.231 |
| 14 NOV65 HONSHU | 8614.81 | 310.80 | 0 | 0 | 0 | 0 | 0 | .021 | -.090 | 0 | .091 | 0 |
| 03 APR66 EAST HONSHU | 8623.25 | 310.73 | -.126 | .051 | -.062 | -.098 | -.092 | -.029 | -.069 | -.018 | -.061 | -.254 |
| 18 FEB66 HONSHU | 8646.41 | 310.98 | -.143 | -.018 | -.034 | -.040 | -.139 | 0 | -.040 | 0 | -.193 | -.191 |
| 05 JAN66 HONSHU | 8699.30 | 310.14 | -.051 | .006 | -.080 | -.255 | -.184 | 0 | -.079 | 0 | -.071 | -.327 |
| 17 MAY66 E C HONSHU | 8716.83 | 310.33 | 0 | .766 | .718 | .725 | .668 | .706 | .749 | .666 | .704 | .524 |
| 16 APR66 E HONSHU | 8725.58 | 309.16 | -.080 | .038 | -.044 | -.131 | -.120 | -.122 | -.090 | -.011 | -.085 | -.190 |
| 05 APR66 HONSHU | 8746.42 | 310.56 | -.135 | -.077 | -.106 | -.134 | -.188 | -.116 | -.102 | -.121 | -.189 | -.255 |
| 14 JUL66 S CST HONSH | 8762.94 | 310.51 | -.076 | -.002 | .006 | -.086 | -.081 | -.049 | -.051 | -.098 | -.039 | -.189 |
| 06 APR67 CST HONSHU | 8917.86 | 310.31 | -.125 | .004 | -.005 | -.173 | -.068 | .022 | .027 | -.058 | -.186 | -.336 |
| 06 APR67 CST HONSHU | 8917.86 | 310.31 | -.125 | .064 | .005 | -.143 | -.188 | -.110 | -.073 | -.088 | -.156 | -.246 |
| 06 APR67 CST HONSHU | 8917.86 | 310.31 | -.144 | -.026 | -.026 | -.093 | -.037 | -.098 | -.054 | -.098 | -.104 | -.198 |
| 06 APR67 CST HONSHU | 8923.69 | 310.38 | -.116 | -.035 | -.105 | -.173 | -.149 | -.168 | -.119 | -.118 | -.057 | -.275 |
| 11 JAN66 HONSHU | 8968.49 | 311.11 | -.124 | -.019 | .036 | -.116 | 0 | 0 | -.043 | 0 | 0 | -.242 |
| 25 JUN66 S. HONSHU | 9145.16 | 309.23 | -.089 | -.037 | -.011 | 0 | -.130 | -.112 | -.046 | -.153 | 0 | 0 |
| 27 NOV65 HONSHU-1 | 9177.48 | 307.15 | -.100 | 0 | .027 | -.040 | -.093 | 0 | -.033 | 0 | -.016 | -.186 |
| 27 NOV65 HONSHU-2 | V186.03 | 307.09 | 0 | -.038 | .057 | .060 | -.094 | 0 | -.062 | -.121 | -.047 | -.135 |
| 12 NOV65 HONSHU | V186.03 | 307.09 | 0 | 0 | 0 | 0 | 0 | 0 | -.082 | 0 | -.017 | -.136 |
| 10 MAR66 S OF HONSHU | 9201.25 | 309.97 | -.069 | -.113 | -.094 | -.195 | -.199 | -.029 | -.080 | -.224 | -.061 | -.247 |
| 23 MAY66 HONSHU | 9253.28 | 307.04 | .001 | .015 | .056 | -.094 | .004 | .050 | -.059 | -.077 | -.019 | -.323 |
| 19 SEP66 S OF HONSHU | 9320.99 | 308.11 | -.043 | .067 | .003 | -.081 | -.059 | -.008 | -.027 | -.139 | -.121 | -.173 |
| | AVERAGE | | -.108 | .023 | .005 | -.076 | -.071 | -.024 | -.028 | -.070 | -.051 | -.195 |
| | SIGMA | | .048 | .179 | .167 | .196 | .180 | .179 | .168 | .193 | .187 | .174 |
| | N | | 20 | 21 | 22 | 21 | 21 | 17 | 24 | 18 | 21 | 21 |

| EVENT NAME | DISTANCE | AZIMUTH | O3 | O4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 02 APR66 EAST HONSHU | 8391.V0 | 311.40 | -.213 | .006 | -.247 | -.031 | -.344 | .066 | -.108 | 0 | -.151 | -.336 |
| 23 JUN66 CST HONSHU | 8482.43 | 311.36 | -.185 | .120 | -.172 | -.046 | -.353 | .021 | .024 | -.456 | -.216 | -.299 |
| 09 MAY66 HONSHU | 8564.86 | 312.79 | -.198 | -.016 | -.263 | -.050 | -.351 | -.014 | -.124 | -.392 | -.225 | -.399 |
| 14 MAR66 HONSHU | 8589.49 | 311.00 | 0 | .056 | -.225 | -.050 | -.363 | -.051 | -.054 | -.295 | -.260 | -.351 |
| 14 NOV65 HONSHU | 8614.81 | 310.80 | 0 | .099 | 0 | -.024 | -.449 | -.004 | .089 | 0 | -.292 | -.142 |
| 03 APR66 EAST HONSHU | 8623.25 | 310.73 | -.129 | .067 | -.022 | -.002 | -.494 | -.035 | -.147 | -.398 | -.318 | -.249 |
| 18 FEB66 HONSHU | 8646.41 | 310.98 | -.161 | 0 | -.135 | -.007 | -.370 | -.037 | -.089 | -.358 | -.258 | -.356 |
| 05 JAN66 HONSHU | 8699.30 | 310.14 | -.095 | .024 | -.131 | -.048 | -.350 | -.045 | -.193 | -.367 | -.331 | -.264 |
| 17 MAY66 E C HONSHU | 8716.83 | 310.33 | .700 | .825 | .626 | .805 | .394 | .728 | .642 | .434 | .472 | .386 |
| 16 APR66 E HONSHU | 8725.58 | 309.16 | -.145 | -.010 | -.144 | -.041 | -.373 | -.036 | -.027 | -.353 | -.264 | -.315 |
| 05 APR66 HONSHU | 8746.42 | 310.56 | -.238 | -.030 | -.172 | -.077 | -.333 | -.060 | -.037 | -.434 | -.268 | -.389 |
| 14 JUL66 S CST HONSH | 8762.94 | 310.51 | -.185 | .049 | -.114 | -.001 | -.355 | -.001 | .033 | -.421 | -.284 | -.348 |
| 06 APR67 CST HONSHU | 8917.86 | 310.31 | -.206 | -.117 | -.153 | -.151 | -.418 | .004 | -.045 | 0 | -.305 | -.355 |
| 06 APR67 CST HONSHU | 8917.86 | 310.31 | -.215 | .003 | -.283 | -.152 | -.448 | -.035 | -.115 | 0 | -.325 | -.414 |
| 06 APR67 CST HONSHU | 8923.69 | 310.38 | -.157 | -.036 | -.150 | -.020 | -.371 | .003 | -.109 | 0 | -.331 | -.493 |
| 06 APR67 CST HONSHU | 8926.43 | 310.25 | -.164 | .032 | -.116 | 0 | -.344 | .065 | -.191 | 0 | -.250 | -.458 |
| 11 JAN66 HONSHU | 8968.49 | 311.11 | -.147 | .002 | -.087 | -.035 | -.287 | -.013 | 0 | -.330 | -.332 | -.347 |
| 25 JUN66 S. HONSHU | 9145.16 | 309.23 | -.122 | -.019 | -.055 | -.081 | -.402 | -.094 | .073 | -.433 | -.453 | -.270 |
| 27 NOV65 HONSHU-1 | 9177.48 | 307.15 | -.102 | .028 | -.071 | -.057 | 0 | -.055 | .007 | -.441 | -.327 | 0 |
| 27 NOV65 HONSHU-2 | 9186.03 | 307.09 | -.200 | .007 | -.124 | -.078 | -.475 | -.084 | -.099 | 0 | -.371 | -.212 |
| 12 NOV65 HONSHU | 9186.03 | 307.09 | -.150 | .007 | -.024 | -.078 | -.325 | -.234 | -.049 | 0 | -.421 | -.312 |
| 10 MAR66 S OF HONSHU | 9201.25 | 309.97 | 0 | .074 | -.199 | -.068 | -.486 | -.135 | -.001 | -.319 | -.374 | -.410 |
| 23 MAY66 HONSHU | 9253.28 | 307.04 | -.152 | .114 | -.056 | -.098 | -.489 | .025 | .005 | -.341 | -.419 | -.254 |
| 19 SEP66 S OF HONSHU | 9320.99 | 308.11 | -.155 | -.012 | -.064 | -.005 | 0 | -.084 | .065 | -.272 | -.325 | -.341 |
| | AVERAGE | | -.125 | .049 | -.104 | -.009 | -.354 | -.005 | .006 | -.319 | -.276 | -.301 |
| | SIGMA | | .193 | .178 | .175 | .185 | .177 | .168 | .189 | .210 | .174 | .170 |
| | N | | 21 | 23 | 23 | 23 | 22 | 24 | 23 | 16 | 24 | 23 |

## EVENT PARAMETERS

| 24 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 02 APR66 EAST HONSHU | 38.700 | 141.900 | 39 | 22 43 21.4 | .0754 | -.037 | 19 |
| 23 JUN66 CST HONSHU | 38.200 | 141.400 | 92 | 21 51 57.4 | .0920 | -.043 | 18 |
| 09 MAY66 HONSHU | 38.400 | 139.300 | 20 | 02 57 48.1 | .0822 | -.065 | 20 |
| 14 MAR66 HONSHU | 37.100 | 140.800 | 63 | 06 38 06.5 | .0527 | -.024 | 18 |
| 14 NOV65 HONSHU | 36.800 | 140.800 | 67 | 05 54 16.7 | .0882 | .029 | 10 |
| 03 APR66 EAST HONSHU | 36.700 | 140.800 | 68 | 04 43 41.1 | .0630 | -.020 | 20 |
| 18 FEB66 HONSHU | 36.700 | 140.400 | 65 | 00 27 53.6 | .0536 | -.025 | 17 |
| 05 JAN66 HONSHU | 35.800 | 140.800 | 90 | 05 46 54.3 | .0791 | -.027 | 18 |
| 17 MAY66 E C HONSHU | 35.800 | 140.500 | 68 | 00 59 06.3 | .7689 | .747 | 19 |
| 16 APR66 E HONSHU | 35.000 | 141.500 | 63 | 10 13 28.0 | .0447 | -.021 | 20 |
| 05 APR66 HONSHU | 37.000 | 138.200 | 4 | 08 51 16.4 | .0841 | -.072 | 20 |
| 14 JUL66 S CST HONSH | 35.600 | 140.000 | 71 | 06 18 47.6 | .0345 | -.014 | 20 |
| 06 APR67 CST HONSHU | 34.400 | 139.100 | 33 | 08 49 41.3 | .0819 | -.049 | 19 |
| 06 APR67 CST HONSHU | 34.400 | 139.100 | 25 | 09 06 44.0 | .0906 | -.071 | 19 |
| 06 APR67 CST HONSHU | 34.400 | 139.000 | 13 | 06 17 29.3 | .0667 | -.044 | 19 |
| 06 APR67 CST HONSHU | 34.300 | 139.100 | 15 | 23 28 51.0 | .0896 | -.081 | 18 |
| 11 JAN66 HONSHU | 33.700 | 137.200 | 33 | 14 16 32.2 | .0384 | -.018 | 15 |
| 25 JUN66 S. HONSHU | 29.000 | 142.100 | 49 | 01 46 10.4 | .0771 | -.043 | 17 |
| 27 NOV65 HONSHU-1 | 30.600 | 140.200 | 60 | 03 04 20.6 | .0447 | -.010 | 15 |
| 27 NOV65 HONSHU-2 | 30.500 | 140.200 | 41 | 03 44 04.9 | .0767 | -.026 | 17 |
| 12 NOV65 HONSHU | 30.500 | 140.200 | 40 | 17 52 24.1 | .0947 | -.036 | 12 |
| 10 MAR66 S OF HONSHU | 32.200 | 137.500 | 382 | 04 26 19.6 | .0983 | -.078 | 19 |
| 23 MAY66 HONSHU | 30.000 | 139.800 | 28 | 08 39 44.4 | .0732 | -.004 | 20 |
| 19 SEP66 S OF HONSHU | 30.200 | 138.400 | 450 | 04 53 10.5 | .0460 | -.005 | 19 |

11 15 67

# R E L A T I V E  T R A V E L - T I M E  A N O M A L I E S

HERRIN66 TRAVEL-TIME TABLES  REFERENCE STATION  A0

INCLUDING ELLIPTICITY

ANOMALY REGION = BONIN-MARIANA-VOLCANO-CAROLINE IS
DISTANCE RANGE = 9477 TO 10873 KM  AZIMUTH RANGE = 292.0 TO 306.2 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 19 JUL66 BONIN IS | 9476.87 | 306.19 | -.209 | -.103 | -.111 | 0 | 0 | -.125 | -.104 | 0 | -.073 | 0 |
| 05 JAN66 MARIANA IS. | 9504.81 | 297.04 | -.270 | 0 | -.030 | -.257 | -.144 | 0 | -.076 | -.135 | -.009 | -.280 |
| 7 MAR 67 VOLCANO IS | 9574.67 | 299.45 | 0 | -.004 | -.004 | 0 | -.131 | -.040 | -.027 | -.092 | -.154 | -.190 |
| 10 FEB66 MARIANA IS | 9606.54 | 298.60 | -.160 | -.106 | -.101 | -.172 | -.121 | -.040 | -.190 | -.072 | -.050 | -.203 |
| 29 MAR66 VOLCANO IS. | 9645.64 | 301.44 | -.028 | -.076 | 0 | -.118 | -.034 | -.124 | -.113 | 0 | -.077 | -.254 |
| 20 NOV65 MARIANA IS | 9685.58 | 299.08 | 0 | 0 | 0 | 0 | 0 | 0 | -.091 | -.148 | -.124 | -.155 |
| 27 OCT 66 MARIANA IS | 9706.51 | 298.70 | -.206 | -.033 | -.064 | -.105 | -.190 | -.171 | -.118 | -.160 | -.189 | -.320 |
| 20 APR 66 MARIANA IS | 9733.63 | 298.86 | -.211 | -.108 | -.106 | -.145 | -.205 | -.137 | -.201 | -.220 | -.135 | 0 |
| 20 APR66 MARIANA IS. | 9740.57 | 298.93 | -.140 | -.108 | -.046 | -.145 | -.244 | -.127 | -.162 | -.190 | -.103 | 0 |
| 1 AUG 66 MARIANA IS | 9762.53 | 299.59 | 0 | -.010 | -.011 | -.003 | 0 | -.070 | -.013 | -.109 | -.063 | -.240 |
| 27 NOV 66 MARIANA IS | 9940.19 | 298.09 | -.163 | -.062 | -.062 | -.199 | -.202 | -.222 | -.150 | -.212 | -.116 | 0 |
| 20 MAY66 S MARIANA | 10197.94 | 299.23 | 0 | -.038 | -.016 | -.112 | -.141 | -.141 | -.106 | -.054 | -.079 | -.261 |
| 23 APR 67 MARIANA IS | 10231.30 | 291.97 | -.109 | .014 | -.009 | -.147 | -.084 | -.173 | -.048 | -.092 | -.072 | -.216 |
| 11 DEC 66 MARIANA IS | 10260.93 | 292.13 | -.108 | -.106 | -.088 | -.181 | -.212 | -.172 | -.169 | -.258 | -.149 | 0 |
| 07 FEB67 MARIANA IS | 10289.74 | 293.19 | -.130 | -.039 | -.062 | -.168 | -.158 | -.069 | -.083 | -.129 | -.185 | -.333 |
| 20 JUL66 SOF MARIANA | 10361.33 | 293.79 | -.079 | -.055 | .041 | 0 | 0 | 0 | 0 | 0 | -.089 | 0 |
| 07 JUL66 S. MARIANA | 10474.66 | 293.53 | -.173 | -.116 | 0 | -.099 | -.206 | 0 | -.212 | -.187 | -.207 | -.333 |
| 07 JAN 67 MARIANA IS | 10614.08 | 293.40 | -.138 | -.129 | -.060 | -.173 | -.185 | -.084 | -.155 | -.190 | -.021 | 0 |
| 07 JUN66 CAROLINE IS | 10872.64 | 295.43 | -.161 | -.131 | -.121 | -.145 | -.120 | -.111 | -.171 | -.205 | -.028 | 0 |
| AVERAGE | | | -.152 | -.073 | -.053 | -.145 | -.158 | -.120 | -.122 | -.153 | -.102 | -.271 |
| SIGMA | | | .059 | .046 | .046 | .056 | .056 | .053 | .059 | .059 | .057 | .057 |
| N | | | 15 | 17 | 16 | 15 | 15 | 15 | 18 | 16 | 19 | 11 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 19 JUL66 BONIN IS | 9476.87 | 306.19 | -.250 | 0 | 0 | -.126 | 0 | 0 | -.025 | -.435 | -.448 | -.411 |
| 05 JAN66 MARIANA IS. | 9504.81 | 297.04 | -.202 | -.019 | 0 | -.230 | -.480 | -.276 | 0 | -.549 | -.584 | -.282 |
| 7 MAR 67 VOLCANO IS | 9574.67 | 299.45 | -.198 | -.093 | -.131 | -.150 | 0 | -.030 | -.077 | -.434 | -.480 | -.224 |
| 10 FEB66 MARIANA IS | 9606.54 | 298.60 | -.248 | -.145 | -.168 | -.108 | -.570 | -.261 | 0 | -.523 | -.352 | -.341 |
| 29 MAR66 VOLCANO IS. | 9645.64 | 301.44 | -.210 | -.150 | -.229 | -.056 | -.402 | -.133 | -.004 | -.365 | 0 | -.280 |
| 20 NOV65 MARIANA IS | 9685.58 | 299.08 | -.277 | -.202 | 0 | 0 | -.420 | -.123 | -.072 | -.495 | 0 | -.295 |
| 27 OCT 66 MARIANA IS | 9706.51 | 298.70 | -.308 | -.182 | -.051 | -.178 | -.583 | -.094 | -.007 | -.396 | -.464 | -.220 |
| 20 APR 66 MARIANA IS | 9733.63 | 298.86 | -.337 | 0 | -.155 | -.173 | -.522 | -.272 | .041 | -.522 | -.415 | 0 |
| 20 APR66 MARIANA IS. | 9740.57 | 298.93 | -.189 | -.179 | .028 | -.201 | -.435 | -.184 | .048 | -.464 | -.471 | -.288 |
| 1 AUG 66 MARIANA IS | 9762.53 | 299.59 | -.194 | 0 | -.045 | -.023 | -.455 | 0 | .026 | -.365 | -.194 | -.250 |
| 27 NOV 66 MARIANA IS | 9940.19 | 298.09 | -.272 | -.188 | -.195 | -.204 | -.556 | -.244 | .047 | -.454 | -.938 | -.354 |
| 20 MAY66 S MARIANA | 10197.94 | 299.23 | -.188 | -.169 | -.132 | -.060 | -.361 | -.107 | -.009 | -.378 | -.277 | -.136 |
| 23 APR 67 MARIANA IS | 10231.30 | 291.97 | -.171 | -.133 | -.108 | .014 | -.383 | -.067 | .036 | -.358 | -.310 | -.260 |
| 11 DEC 66 MARIANA IS | 10260.93 | 292.13 | -.289 | 0 | -.132 | -.102 | 0 | -.238 | .041 | -.471 | -.435 | -.318 |
| 07 FEB67 MARIANA IS | 10289.74 | 293.19 | -.168 | -.183 | -.087 | -.156 | -.418 | -.169 | -.083 | -.487 | -.230 | -.409 |
| 20 JUL66 SOF MARIANA | 10361.33 | 293.79 | -.197 | 0 | 0 | 0 | -.398 | -.143 | 0 | 0 | -.344 | 0 |
| 07 JUL66 S. MARIANA | 10474.66 | 293.53 | -.265 | -.222 | -.226 | -.167 | 0 | -.161 | 0 | -.350 | -.401 | -.292 |
| 07 JAN 67 MARIANA IS | 10614.08 | 293.40 | -.290 | -.313 | -.139 | -.038 | -.418 | -.291 | -.002 | -.337 | -.361 | -.475 |
| 07 JUN66 CAROLINE IS | 10872.64 | 295.43 | -.216 | 0 | -.249 | -.127 | -.441 | -.295 | .085 | -.523 | -.468 | -.418 |
| AVERAGE | | | -.232 | -.168 | -.135 | -.123 | -.497 | -.182 | .013 | -.439 | -.422 | -.309 |
| SIGMA | | | .059 | .066 | .076 | .070 | .099 | .084 | .049 | .069 | .165 | .097 |
| N | | | 19 | 13 | 15 | 17 | 15 | 17 | 15 | 18 | 17 | 17 |

## E V E N T  P A R A M E T E R S

| 19 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 19 JUL66 BONIN IS | 27.900 | 139.100 | 554 | 06 22 21.0 | .0441 | -.024 | 12 |
| 05 JAN66 MARIANA IS. | 21.800 | 146.600 | 34 | 18 10 00.0 | .1015 | -.031 | 16 |
| 7 MAR 67 VOLCANO IS | 22.900 | 144.200 | 33 | 08 28 56.7 | .0770 | .039 | 17 |
| 10 FEB66 MARIANA IS | 20.800 | 146.300 | 43 | 14 21 10.9 | .0570 | -.004 | 19 |
| 29 MAR66 VOLCANO IS. | 23.700 | 142.100 | 79 | 02 17 00.0 | .0633 | .032 | 17 |
| 20 NOV65 MARIANA IS | 21.900 | 143.800 | 33 | 03 37 31.0 | .0607 | -.018 | 11 |
| 27 OCT 66 MARIANA IS | 20.200 | 145.600 | 118 | 09 18 15.5 | .0575 | -.010 | 20 |
| 20 APR 66 MARIANA IS | 18.800 | 146.900 | 55 | 16 26 21.2 | .0572 | -.043 | 17 |
| 20 APR66 MARIANA IS. | 18.800 | 146.800 | 47 | 06 43 00.0 | .0540 | -.007 | 19 |
| 1 AUG 66 MARIANA IS | 21.700 | 142.900 | 313 | 11 50 15.5 | .1124 | .077 | 16 |
| 27 NOV 66 MARIANA IS | 17.500 | 145.400 | 214 | 13 41 19.0 | .1307 | -.063 | 19 |
| 20 MAY66 S MARIANA | 13.900 | 146.100 | 66 | 09 14 49.2 | .0627 | .038 | 19 |
| 23 APR 67 MARIANA IS | 13.500 | 146.100 | 56 | 17 52 51.0 | .0744 | .058 | 20 |
| 11 DEC 66 MARIANA IS | 13.400 | 145.800 | 59 | 19 52 09.4 | .0470 | -.028 | 17 |
| 07 FEB67 MARIANA IS | 13.900 | 144.800 | 135 | 08 28 57.9 | .0691 | .005 | 20 |
| 20 JUL66 SOF MARIANA | 13.800 | 143.900 | 186 | 20 50 50.0 | .0686 | .056 | 8 |
| 07 JUL66 S. MARIANA | 12.200 | 144.200 | 40 | 09 46 33.2 | .0601 | -.027 | 16 |
| 07 JAN 67 MARIANA IS | 11.800 | 142.700 | 36 | 13 34 48.3 | .0770 | -.012 | 19 |
| 07 JUN66 CAROLINE IS | 11.300 | 139.600 | 50 | 13 59 36.0 | .0668 | -.025 | 18 |

11 15 67

# RELATIVE TRAVEL-TIME ANOMALIES

HERRIN66 TRAVEL-TIME TABLES — INCLUDING ELLIPTICITY — REFERENCE STATION A0

ANOMALY REGION = CHINA SEA - RYUKYU - TAIWAN
DISTANCE RANGE = 9686 TO 10790 KM  AZIMUTH RANGE = 312.3 TO 316.6 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18 MAY67 KYUSHU | 9685.82 | 313.97 | -.067 | .057 | -.023 | -.122 | -.086 | .015 | .010 | -.109 | -.012 | -.151 |
| 20 FEB67 RYUKYU | 9941.16 | 313.05 | -.055 | -.026 | -.015 | -.099 | -.143 | -.083 | -.123 | -.181 | -.076 | 0 |
| 04 JAN66 E CHINA SEA | 10016.97 | 315.49 | -.099 | -.051 | -.056 | -.239 | -.179 | -.031 | -.069 | -.145 | .023 | 0 |
| 21 MAR66 RYUKYU | 10229.69 | 312.28 | -.085 | .010 | -.017 | -.097 | -.095 | -.036 | -.084 | -.138 | -.018 | -.146 |
| 20 MAY66 RYUKYU | 10336.94 | 312.48 | 0 | -.056 | -.051 | -.083 | -.168 | -.089 | -.073 | -.171 | -.089 | -.241 |
| 21 FEB66 N.E. TAIWAN | 10399.73 | 314.93 | -.153 | -.047 | -.104 | -.194 | -.159 | 0 | -.111 | -.169 | -.066 | -.913 |
| 16 NOV65 RYUKYU IS | 10510.64 | 314.82 | 0 | 0 | 0 | 0 | 0 | 0 | .029 | 0 | -.063 | 0 |
| 10 JUL66 SW RYUKYU | 10622.43 | 314.18 | -.117 | -.056 | -.025 | -.149 | .022 | .023 | -.105 | -.166 | .037 | -.101 |
| 01 JULY 66 TAIWAN | 10711.30 | 314.59 | 0 | 0 | -.033 | -.177 | -.207 | -.171 | 0 | 0 | -.071 | -.138 |
| 28 MAY66 TAIWAN | 10749.10 | 314.38 | 0 | -.023 | .043 | -.114 | -.106 | -.214 | -.038 | -.090 | -.025 | -.169 |
| 23 FEB67 TAIWAN I | 10768.00 | 314.28 | .005 | -.074 | 0 | -.073 | -.136 | -.146 | -.078 | -.106 | -.088 | -.146 |
| 12 MAR66 TAIWAN | 10772.15 | 314.15 | .013 | -.105 | -.084 | -.181 | .004 | .022 | -.218 | -.193 | -.042 | -.072 |
| 23 MAR66 TAIWAN | 10789.82 | 313.83 | -.033 | -.099 | .008 | -.189 | -.157 | -.056 | -.009 | -.102 | -.040 | -.239 |
| AVERAGE | | | -.065 | -.043 | -.032 | -.143 | -.118 | -.070 | -.077 | -.143 | -.042 | -.162 |
| SIGMA | | | .056 | .047 | .041 | .053 | .070 | .080 | .067 | .036 | .041 | .056 |
| N | | | 9 | 11 | 11 | 11 | 12 | 11 | 12 | 11 | 13 | 10 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18 MAY67 KYUSHU | 9685.82 | 313.97 | -.189 | -.029 | -.171 | .008 | -.337 | -.177 | .074 | -.196 | -.395 | -.510 |
| 20 FEB67 RYUKYU | 9941.16 | 313.05 | 0 | -.106 | -.077 | -.043 | -.393 | -.208 | .048 | -.261 | -.456 | -.466 |
| 04 JAN66 E CHINA SEA | 10016.97 | 315.49 | -.253 | -.079 | -.180 | -.061 | -.308 | -.206 | .133 | -.321 | -.395 | -.512 |
| 21 MAR66 RYUKYU | 10229.69 | 312.28 | -.223 | -.103 | -.077 | .008 | -.377 | -.137 | .156 | -.240 | -.489 | -.275 |
| 20 MAY66 RYUKYU | 10336.94 | 312.48 | -.280 | -.118 | -.104 | -.220 | -.436 | -.262 | .111 | -.566 | -.450 | -.436 |
| 21 FEB66 N.E. TAIWAN | 10399.73 | 314.93 | -.244 | 0 | -.106 | -.122 | -.366 | -.189 | .042 | -.200 | -.397 | -.419 |
| 16 NOV65 RYUKYU IS | 10510.64 | 314.82 | -.261 | 0 | -.122 | -.080 | -.238 | 0 | 0 | 0 | -.377 | -.411 |
| 10 JUL66 SW RYUKYU | 10622.43 | 314.18 | -.166 | -.209 | -.212 | -.163 | -.373 | -.267 | .048 | -.486 | -.420 | -.126 |
| 01 JULY 66 TAIWAN | 10711.30 | 314.59 | -.234 | -.129 | -.212 | -.164 | -.393 | -.251 | .004 | -.435 | 0 | -.935 |
| 28 MAY66 TAIWAN | 10749.10 | 314.38 | -.145 | -.014 | .049 | -.094 | -.289 | .074 | .161 | -.230 | -.326 | 0 |
| 23 FEB67 TAIWAN I | 10768.00 | 314.28 | -.245 | -.053 | -.103 | -.098 | -.360 | -.031 | .123 | -.191 | -.365 | -.230 |
| 12 MAR66 TAIWAN | 10772.15 | 314.15 | 0 | -.105 | -.057 | -.032 | -.278 | -.031 | .132 | -.268 | -.399 | -.170 |
| 23 MAR66 TAIWAN | 10789.82 | 313.83 | -.243 | -.061 | -.122 | .155 | -.273 | -.106 | .184 | -.180 | -.399 | -.206 |
| AVERAGE | | | -.226 | -.091 | -.121 | -.057 | -.340 | -.149 | .103 | -.298 | -.406 | -.397 |
| SIGMA | | | .042 | .054 | .073 | .104 | .058 | .107 | .055 | .129 | .043 | .146 |
| N | | | 11 | 11 | 13 | 13 | 13 | 12 | 12 | 12 | 12 | 12 |

# EVENT PARAMETERS

| 13 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 18 MAY67 KYUSHU | 31.100 | 130.700 | 43 | 23 39 15.2 | .0582 | .023 | 20 |
| 20 FEB67 RYUKYU | 29.200 | 129.200 | 22 | 12 14 33.7 | .0412 | -.015 | 18 |
| 04 JAN66 E CHINA SEA | 29.500 | 127.300 | 71 | 02 48 53.0 | .0495 | -.017 | 19 |
| 21 MAR66 RYUKYU | 26.100 | 129.100 | 33 | 06 29 01.0 | .0481 | .020 | 20 |
| 20 MAY66 RYUKYU | 25.400 | 128.300 | 58 | 02 53 47.4 | .0890 | -.050 | 19 |
| 21 FEB66 N.E. TAIWAN | 26.300 | 125.700 | 183 | 13 18 47.0 | .0518 | -.032 | 18 |
| 16 NOV65 RYUKYU IS | 25.400 | 125.200 | 77 | 17 05 37.9 | .0778 | .037 | 8 |
| 10 JUL66 SW RYUKYU | 24.200 | 125.200 | 28 | 16 12 41.5 | .0987 | -.032 | 20 |
| 01 JULY 66 TAIWAN | 24.800 | 122.500 | 147 | 05 50 39.2 | .0857 | -.067 | 15 |
| 28 MAY66 TAIWAN | 24.400 | 122.500 | 33 | 00 03 56.8 | .0913 | .048 | 18 |
| 23 FEB67 TAIWAN I | 24.200 | 122.500 | 48 | 14 25 43.9 | .0666 | .023 | 19 |
| 12 MAR66 TAIWAN | 24.100 | 122.600 | 63 | 16 31 21.8 | .0899 | .030 | 19 |
| 23 MAR66 TAIWAN | 23.800 | 122.800 | 51 | 00 04 34.7 | .0832 | .036 | 20 |

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# RELATIVE TRAVEL-TIME ANOMALIES

HERRIN68TRAVEL-TIME TABLES — REFERENCE STATION A0

INCLUDING ELLIPTICITY

ANOMALY REGION = N. E. CHINA
DISTANCE RANGE = 9081 TO 9844 KM AZIMUTH RANGE = 327.7 TO 328.4 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 27 MAR 67 NE CHINA | 9081.88 | 327.74 | -.010 | .065 | .047 | 0 | -.088 | .030 | .129 | -.119 | .054 | -.055 |
| 22 MAR68 N. E. CHINA | 9830.31 | 328.38 | -.034 | -.041 | .073 | -.110 | -.040 | .092 | .071 | -.069 | .178 | -.040 |
| 29 MAR 68 NE CHINA | 9844.21 | 328.40 | -.124 | .050 | 0 | -.101 | -.117 | -.007 | -.039 | 0 | -.011 | -.077 |
| | AVERAGE | | -.056 | .025 | .060 | -.105 | -.084 | .032 | .054 | -.094 | .074 | -.021 |
| | SIGMA | | .068 | .057 | .018 | .007 | .035 | .034 | .085 | .036 | .096 | .068 |
| | N | | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 2 | 3 | 3 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 27 MAR 67 NE CHINA | 9081.88 | 327.74 | -.180 | -.083 | -.032 | .142 | -.088 | -.193 | .248 | .209 | .069 | -.671 |
| 22 MAR68 N. E. CHINA | 9830.31 | 328.38 | -.111 | -.004 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 |
| 29 MAR 68 NE CHINA | 9844.21 | 328.40 | -.181 | -.101 | -.027 | .057 | -.208 | -.216 | -.003 | -.016 | 0 | -.729 |
| | AVERAGE | | -.150 | -.064 | -.030 | .099 | -.148 | -.205 | .122 | .092 | .069 | -.700 |
| | SIGMA | | .040 | .049 | .003 | .060 | .085 | .016 | .177 | .153 | 0 | .041 |
| | N | | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 1 | 2 |

## EVENT PARAMETERS

| 3 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 27 MAR 67 NE CHINA | 38.400 | 116.500 | 61 | 08 58 25.5 | .0535 | .028 | 19 |
| 22 MAR68 N. E. CHINA | 37.500 | 115.000 | 11 | 08 11 33.7 | .0470 | .021 | 12 |
| 29 MAR 68 NE CHINA | 37.400 | 114.900 | 34 | 08 12 00.4 | .0826 | -.044 | 17 |

11 15 67 R E L A T I V E T R A V E L - T I M E A N O M A L I E S

HERRIN66 TRAVEL-TIME TABLES REFERENCE STATION A0
INCLUDING ELLIPTICITY

ANOMALY REGION = SEVERNAYA ZEMLYA
DISTANCE RANGE = 5337 TO 5376 KM AZIMUTH RANGE = 356.3 TO 357.9 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 09 JUN66 SEVERNAYA | 5336.96 | 357.92 | -1.514 | -1.455 | -1.429 | -1.422 | -1.483 | -1.488 | -1.398 | 2.990 | -1.436 | -.172 |
| 30 JUL 66 SEV ZEMLYA | 5375.76 | 356.25 | -.066 | -.032 | -.013 | 0 | -.043 | .030 | .041 | -.039 | -.093 | -.017 |
| AVERAGE | | | -.790 | -.744 | -.721 | -1.422 | -.763 | -.729 | -.678 | 1.475 | -.765 | -.204 |
| SIGMA | | | 1.024 | 1.006 | 1.001 | 0 | 1.018 | 1.074 | 1.017 | 2.141 | .960 | .803 |
| N | | | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 09 JUN66 SEVERNAYA | 5336.96 | 357.92 | 3.429 | 5.269 | -4.123 | -2.968 | -5.979 | -1.966 | 5.059 | -6.740 | -8.957 | .460 |
| 30 JUL 66 SEV ZEMLYA | 5375.76 | 356.25 | -.167 | -.155 | -.096 | .048 | -.193 | -.512 | .394 | -.224 | 0 | -.645 |
| AVERAGE | | | 1.631 | 2.557 | -2.109 | -1.460 | -3.086 | -1.239 | 2.332 | -3.482 | -8.957 | -.093 |
| SIGMA | | | 2.542 | 3.836 | 2.848 | 2.132 | 4.092 | 1.028 | 3.856 | 4.607 | 0 | .782 |
| N | | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 |

E V E N T P A R A M E T E R S

| 2 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 09 JUN66 SEVERNAYA | 82.300 | 92.900 | 33 | 06 57 52.0 | 1.8838 | .914 | 20 |
| 30 JUL 66 SEV ZEMLYA | 84.500 | 104.200 | 29 | 20 32 00.7 | 1.9915 | .571 | 18 |

11 15 67 RELATIVE TRAVEL-TIME ANOMALIES

HERRIN66 TRAVEL-TIME TABLES REFERENCE STATION A0

INCLUDING ELLIPTICITY

ANOMALY REGION = LAKE BAIKAL - MONGOLIA
DISTANCE RANGE = 8654 TO 9154 KM AZIMUTH RANGE = 340.2 TO 341.1 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11 FEB67 LAKE BAIKAL | 8654.42 | 34n.18 | -.065 | 0 | -.012 | -.045 | .171 | .198 | .064 | -.147 | .316 | .051 |
| 30 AUG66 LAKE BAIKAL | 8731.14 | 341.13 | .113 | .127 | .082 | -.031 | .264 | .164 | .125 | -.069 | .366 | .152 |
| 05 JAN67 MONGOLIA | 9144.36 | 34n.78 | 0 | .074 | -.014 | -.062 | .256 | .128 | .086 | -.119 | .208 | 0 |
| 18 JAN67 MONGOLIA | 9144.36 | 34n.78 | .091 | .175 | .106 | -.102 | .155 | .208 | .037 | -.019 | 0 | .044 |
| 05 JAN67 MONGOLIA | 9146.88 | 34n.84 | .022 | .005 | -.064 | -.192 | .104 | .209 | .147 | -.120 | .329 | .185 |
| 20 JAN67 MONGOLIA | 9154.83 | 34n.74 | .100 | .115 | .077 | -.053 | .064 | .218 | .038 | -.160 | .236 | .116 |
| | AVERAGE | | .078 | .099 | .022 | -.070 | .169 | .187 | .083 | -.106 | .291 | .110 |
| | SIGMA | | .036 | .064 | .068 | .074 | .080 | .035 | .046 | .052 | .064 | .062 |
| | N | | 5 | 5 | 6 | 6 | 6 | 6 | 6 | 6 | 5 | 5 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11 FEB67 LAKE BAIKAL | 8654.42 | 34n.18 | 0 | .074 | .287 | .297 | -.280 | 0 | .663 | -.224 | -.215 | -.355 |
| 30 AUG66 LAKE BAIKAL | 8731.14 | 341.13 | -.188 | .056 | .366 | .345 | 0 | -.281 | .671 | -.058 | -.228 | -.258 |
| 05 JAN67 MONGOLIA | 9144.36 | 34n.78 | -.341 | -.062 | .381 | .201 | -.157 | -.370 | .556 | -.154 | -.274 | -.449 |
| 18 JAN67 MONGOLIA | 9144.36 | 34n.78 | 0 | -.003 | .389 | .223 | 0 | -.292 | .533 | -.211 | -.191 | -.434 |
| 05 JAN67 MONGOLIA | 9146.88 | 34n.84 | -.161 | .096 | .230 | .077 | -.355 | -.525 | .498 | 0 | -.325 | -.507 |
| 20 JAN67 MONGOLIA | 9154.83 | 34n.74 | -.199 | -.005 | .285 | .145 | -.259 | -.382 | .567 | -.204 | -.255 | -.540 |
| | AVERAGE | | -.222 | .026 | .323 | .215 | -.263 | -.370 | .581 | -.171 | -.248 | -.424 |
| | SIGMA | | .080 | .059 | .065 | .098 | .081 | .098 | .070 | .068 | .068 | .103 |
| | N | | 4 | 6 | 6 | 6 | 4 | 5 | 6 | 5 | 6 | 6 |

EVENT PARAMETERS

| 6 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 11 FEB67 LAKE BAIKAL | 52.000 | 106.200 | 5 | 09 27 29.6 | .0466 | .006 | 17 |
| 30 AUG66 LAKE BAIKAL | 51.700 | 104.400 | 33 | 06 10 33.4 | .0791 | .063 | 19 |
| 05 JAN67 MONGOLIA | 48.100 | 102.900 | 61 | 23 58 21.4 | .0591 | -.014 | 18 |
| 18 JAN67 MONGOLIA | 48.100 | 102.900 | 33 | 21 49 25.8 | .0536 | .012 | 17 |
| 05 JAN67 MONGOLIA | 48.100 | 102.800 | 33 | 00 14 40.4 | .0882 | -.044 | 19 |
| 20 JAN67 MONGOLIA | 48.000 | 102.900 | 33 | 01 57 23.1 | .0493 | -.021 | 20 |

11 15 67 RELATIVE TRAVEL-TIME ANOMALIES

HERRIN6&1HAVEL-TIME TABLES REFERENCE STATION AA

INCLUDING ELLIPTICITY

ANOMALY REGION = KAZAKH

DISTANCE RANGE = 9310 TO 9332 KM AZIMUTH RANGE = 357.2 TO 357.3 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 05 AUG66 E KAZAKH | 9310.12 | 357.25 | .033 | -.023 | -.034 | -.031 | .035 | .148 | .011 | -.136 | .099 | 0 |
| 24 DEC65 KAZAKH | 9310.12 | 357.25 | 0 | 0 | 0 | 0 | .035 | .098 | .051 | -.158 | .049 | -.200 |
| 20 MAR66 KAZAKH | 9310.12 | 357.25 | .103 | -.003 | -.034 | -.041 | .075 | .138 | .001 | -.066 | .139 | -.290 |
| 29 JUN66 E. KAZAKH | 9310.12 | 357.25 | .103 | .127 | -.014 | .029 | .055 | .048 | -.089 | -.056 | .109 | -.100 |
| 21 JUL66 KAZAKH | 9310.48 | 357.32 | .044 | .077 | -.015 | -.041 | .088 | .189 | .051 | -.186 | .100 | -.129 |
| 21 NOV65 KAZAKH | 9320.86 | 357.18 | 0 | 0 | 0 | 0 | .024 | .187 | -.008 | -.168 | .036 | -.150 |
| 13 FEB66 KAZAKH | 9320.86 | 357.18 | .062 | .017 | -.064 | -.051 | .034 | 0 | -.048 | -.126 | .046 | -.149 |
| 21 APR66 KAZAKH | 9321.24 | 357.25 | -.007 | -.023 | -.054 | -.141 | .054 | .068 | -.078 | -.156 | .078 | 0 |
| 20 APR 67 KAZAKH | 9331.98 | 357.18 | -.018 | -.023 | -.083 | -.002 | .002 | .097 | .553 | -.186 | -.035 | -.217 |
| AVERAGE | | | .046 | .021 | -.043 | -.040 | .042 | .122 | .052 | -.137 | .069 | -.178 |
| SIGMA | | | .048 | .059 | .026 | .053 | .023 | .052 | .194 | .048 | .052 | .064 |
| N | | | 7 | 7 | 7 | 7 | 9 | 8 | 9 | 9 | 9 | 7 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 05 AUG66 E KAZAKH | 9310.12 | 357.25 | -.304 | .074 | .264 | -.145 | -.540 | -.715 | .222 | -.521 | -.711 | -.376 |
| 24 DEC65 KAZAKH | 9310.12 | 357.25 | -.334 | .054 | .214 | -.143 | -.540 | -.725 | .082 | -.531 | -.781 | -.444 |
| 20 MAR66 KAZAKH | 9310.12 | 357.25 | -.354 | -.076 | .224 | -.045 | -.520 | -.605 | .192 | -.511 | -.721 | -.406 |
| 29 JUN66 E. KAZAKH | 9310.12 | 357.25 | -.244 | -.036 | .194 | -.155 | -.520 | -.575 | .152 | -.501 | 0 | -.426 |
| 21 JUL66 KAZAKH | 9310.48 | 357.32 | -.265 | .063 | .265 | -.092 | -.560 | -.678 | 0 | -.509 | -.655 | -.459 |
| 21 NOV65 KAZAKH | 9320.86 | 357.18 | -.341 | -.058 | .119 | -.107 | -.494 | -.683 | .042 | 0 | -.841 | -.489 |
| 13 FEB66 KAZAKH | 9320.86 | 357.18 | -.311 | .012 | .159 | -.177 | -.564 | -.633 | .192 | -.507 | -.701 | -.379 |
| 21 APR66 KAZAKH | 9321.24 | 357.25 | -.342 | -.028 | .190 | -.154 | -.615 | -.636 | .076 | -.514 | -.715 | -.492 |
| 20 APR 67 KAZAKH | 9331.98 | 357.18 | -.330 | .030 | .144 | -.195 | -.479 | -.644 | .228 | -.460 | -.885 | -.458 |
| AVERAGE | | | -.314 | .004 | .197 | -.135 | -.548 | -.655 | .135 | -.507 | -.724 | -.428 |
| SIGMA | | | .038 | .055 | .051 | .046 | .038 | .050 | .085 | .021 | .056 | .039 |
| N | | | 9 | 9 | 9 | 9 | 9 | 9 | 8 | 8 | 8 | 9 |

EVENT PARAMETERS

| 9 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 05 AUG66 E KAZAKH | 49.900 | 78.000 | 0 | 03 57 58.1 | .0405 | .010 | 19 |
| 24 DEC65 KAZAKH | 49.900 | 78.000 | 0 | 04 59 58.3 | .0320 | -.016 | 18 |
| 20 MAR66 KAZAKH | 49.900 | 78.000 | 0 | 05 49 58.2 | .0534 | .011 | 20 |
| 29 JUN66 E. KAZAKH | 49.900 | 78.000 | 0 | 06 57 58.1 | .0618 | .022 | 19 |
| 21 JUL66 KAZAKH | 49.900 | 77.900 | 0 | 03 57 57.8 | .0432 | .022 | 19 |
| 21 NOV65 KAZAKH | 49.800 | 78.100 | 0 | 04 57 57.9 | .0588 | -.024 | 15 |
| 13 FEB66 KAZAKH | 49.800 | 78.100 | 0 | 04 57 57.7 | .0352 | -.003 | 19 |
| 21 APR66 KAZAKH | 49.800 | 78.000 | 0 | 03 57 58.0 | .0529 | -.034 | 19 |
| 20 APR 67 KAZAKH | 49.700 | 78.100 | 0 | 04 07 57.6 | .1237 | .203 | 20 |

11 15 67 RELATIVE TRAVEL-TIME ANOMALIES

HERRIN66 TRAVEL-TIME TABLES REFERENCE STATION AB

INCLUDING ELLIPTICITY

ANOMALY REGION = SINKIANG
DISTANCE RANGE = 9902 TO 10717 KM AZIMUTH RANGE = 348.9 TO 352.8 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 NOV65 SINKIANG | 9901.79 | 349.89 | 0 | 0 | 0 | -.136 | .042 | .041 | -.090 | -.244 | .130 | -.148 |
| 25 APR 67 SINKIANG | 9967.12 | 351.39 | .107 | .018 | -.036 | -.048 | .033 | .138 | -.039 | -.150 | .148 | -.059 |
| 19 FEB 67 SINKIANG | 10149.51 | 352.77 | -.079 | -.042 | .009 | -.140 | -.016 | -.018 | -.147 | -.273 | .099 | -.306 |
| 10 FEB 67 SINKIANG | 10163.87 | 351.71 | -.006 | -.077 | .020 | -.180 | .008 | -.182 | -.250 | 0 | .175 | -.425 |
| 14 OCT 66 SINKIANG | 10716.58 | 348.90 | .027 | -.059 | .002 | -.185 | -.053 | -.051 | -.150 | -.235 | .137 | -.335 |
| AVERAGE | | | .012 | -.040 | -.001 | -.130 | .003 | -.010 | -.135 | -.226 | .137 | -.255 |
| SIGMA | | | .077 | .041 | .024 | .047 | .039 | .111 | .079 | .053 | .028 | .148 |
| N | | | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 4 | 5 | 5 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 NOV65 SINKIANG | 9901.79 | 349.89 | -.341 | -.141 | .169 | -.088 | -.523 | -.726 | .286 | -.448 | -.501 | -.710 |
| 25 APR 67 SINKIANG | 9967.12 | 351.39 | -.256 | -.080 | .267 | -.011 | -.456 | -.588 | .358 | -.357 | -.412 | -.621 |
| 19 FEB 67 SINKIANG | 10149.51 | 352.77 | -.486 | -.179 | .144 | -.294 | -.615 | -.785 | .269 | -.729 | -.792 | -.813 |
| 10 FEB 67 SINKIANG | 10163.87 | 351.71 | -.492 | -.228 | .063 | -.389 | -.617 | 0 | .122 | -.872 | -.811 | -.811 |
| 14 OCT 66 SINKIANG | 10716.58 | 348.90 | -.437 | -.115 | .164 | -.423 | -.679 | -.585 | .279 | -.883 | -.742 | -.764 |
| AVERAGE | | | -.403 | -.149 | .181 | -.237 | -.578 | -.666 | .283 | -.817 | -.651 | -.744 |
| SIGMA | | | .102 | .057 | .073 | .190 | .088 | .093 | .068 | .211 | .183 | .080 |
| N | | | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 5 |

EVENT PARAMETERS

| 5 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 13 NOV65 SINKIANG | 43.800 | 87.800 | 59 | 04 33 53.0 | .0808 | .048 | 17 |
| 25 APR 67 SINKIANG | 43.300 | 87.000 | 34 | 10 30 37.8 | .1387 | .112 | 20 |
| 19 FEB 67 SINKIANG | 42.000 | 83.500 | 33 | 20 08 20.9 | .0829 | -.045 | 20 |
| 10 FEB 67 SINKIANG | 41.600 | 86.200 | 23 | 05 51 01.9 | .1171 | -.085 | 18 |
| 14 OCT 66 SINKIANG | 36.400 | 87.500 | 24 | 01 04 43.3 | .0850 | -.030 | 20 |

11 15 67 RELATIVE TRAVEL-TIME ANOMALIES

HERRIN66 TRAVEL-TIME TABLES REFERENCE STATION A0

INCLUDING ELLIPTICITY

ANOMALY REGION = HINDU KUSH AREA

DISTANCE RANGE = 10306 TO 10992 KM AZIMUTH RANGE = .5 TO 360.0 DEGREES

| | EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 | APR66 KIRGIZ SSR | 10306.15 | 1.27 | .060 | .019 | .009 | .022 | .066 | .008 | -.065 | -.117 | .056 | -.222 |
| 02 | FEB67 SINKIANG | 10450.4A | 358.67 | -.071 | -.100 | -.003 | -.132 | .037 | -.077 | -.180 | -.091 | .142 | -.293 |
| 11 | MAY 67 SINKIANG | 10485.29 | 350.98 | -.030 | -.07A | -.094 | -.178 | .007 | -.0A6 | -.219 | -.117 | .031 | -.A21 |
| 28 | JAN66 TDZHK-SNKG | 10A96.15 | .53 | -.017 | -.111 | .004 | -.180 | -.042 | -.020 | -.179 | -.212 | -.021 | -.203 |
| 31 | MAR66 HINDU KUSH | 10A13.A9 | 2.A2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16 | NOV65 AFGHAN-USSR | 10A14.70 | 2.10 | 0 | 0 | 0 | -.035 | .060 | -.013 | -.132 | -.251 | -.009 | 0 |
| 04 | JUN66 HINDU KUSH | 10A24.58 | 2.43 | 0 | 0 | -.010 | -.002 | 0 | 0 | 0 | -.212 | .023 | -.473 |
| 06 | JUN66 AFGHAN-USSR | 10A25.79 | 2.10 | -.069 | -.041 | -.087 | .046 | .052 | -.083 | -.273 | 0 | .153 | -.402 |
| 01 | OCT66 W PAKISTAN | 10991.5A | 2.31 | .012 | -.081 | -.038 | -.044 | .0A2 | 0 | -.183 | -.193 | .0A7 | -.227 |
| | | AVERAGE | | -.019 | -.066 | -.081 | -.063 | .032 | -.039 | -.170 | -.170 | .053 | -.320 |
| | | SIGMA | | .050 | .049 | .048 | .089 | .030 | .037 | .057 | .061 | .064 | .110 |
| | | N | | 6 | 6 | 7 | 8 | 7 | 6 | 7 | 7 | 8 | 7 |

| | EVENT NAME | DISTANCE | AZIMUTH | D3 | DA | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 | APR66 KIRGIZ SSR | 10306.15 | 1.27 | -.291 | -.122 | .145 | -.198 | -.514 | -.728 | .033 | -.663 | -.778 | -.492 |
| 02 | FEB67 SINKIANG | 10450.4A | 358.67 | -.AA5 | -.090 | .122 | -.101 | -.679 | -.735 | .393 | -.517 | -.848 | -.387 |
| 11 | MAY 67 SINKIANG | 10485.2V | 350.98 | -.A09 | -.203 | .00A | -.113 | -.565 | -.720 | .151 | -.527 | -.771 | -.590 |
| 28 | JAN66 TDZHK-SNKG | 10A96.15 | .53 | -.375 | -.171 | .055 | -.276 | -.40A | -.A52 | .193 | -.55A | -.A18 | -.501 |
| 31 | MAR66 HINDU KUSH | 10A13.49 | 2.42 | 0 | 0 | .169 | -.289 | -.720 | -.645 | .196 | -.761 | -.8A2 | -.312 |
| 16 | NOV65 AFGHAN-USSR | 10A14.70 | 2.10 | -.A69 | -.143 | .081 | -.395 | -.686 | 0 | .185 | -.813 | -.987 | -.492 |
| 0A | JUN66 HINDU KUSH | 10A24.58 | 2.A3 | -.390 | 0 | .179 | -.209 | -.A06 | -.686 | .138 | -.728 | -.922 | -.370 |
| 06 | JUN66 AFGHAN-USSR | 10A25.79 | 2.10 | -.391 | -.060 | .210 | -.317 | -.610 | -.625 | .208 | -.737 | -.782 | -.339 |
| 01 | OCT66 W PAKISTAN | 10991.5A | 2.31 | -.A0A | -.093 | .166 | -.306 | 0 | -.723 | .177 | -.651 | -.81A | -.A01 |
| | | AVERAGE | | -.397 | -.126 | .126 | -.258 | -.623 | -.717 | .170 | -.662 | -.841 | -.432 |
| | | SIGMA | | .053 | .050 | .067 | .089 | .127 | .066 | .077 | .108 | .067 | .092 |
| | | N | | 8 | 7 | 9 | 9 | 8 | 8 | 9 | 9 | 9 | 9 |

E V E N T P A R A M E T E R S

| | 9 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|---|
| 30 | APR66 KIRGIZ SSR | 41.000 | 72.100 | 19 | 13 A1 09.1 | .0760 | .041 | 20 |
| 02 | FEB67 SINKIANG | 39.700 | 75.500 | 39 | 07 37 5A.9 | .0672 | .017 | 20 |
| 11 | MAY 67 SINKIANG | 39.A00 | 73.800 | 21 | 14 50 58.8 | .0821 | -.017 | 20 |
| 28 | JAN66 TDZHK-SNKG | 39.300 | 73.100 | 20 | 08 42 02.2 | .0841 | -.007 | 20 |
| 31 | MAR66 HINDU KUSH | 36.400 | 70.800 | 280 | 23 38 00.5 | .0783 | -.012 | 8 |
| 16 | NOV65 AFGHAN-USSR | 36.A00 | 71.200 | 241 | 01 03 55.7 | .0777 | -.045 | 15 |
| 04 | JUN66 HINDU KUSH | 36.300 | 70.800 | 207 | 05 11 5A.2 | .0804 | -.027 | 14 |
| 06 | JUN66 AFGHAN-USSR | 36.300 | 71.200 | 225 | 07 4A 16.2 | .0683 | .014 | 19 |
| 01 | OCT66 W PAKISTAN | 34.800 | 71.000 | 25 | 07 3A 29.0 | .0326 | .010 | 18 |

11 15 67 RELATIVE TRAVEL-TIME ANOMALIES

HERRIN 68 TRAVEL-TIME TABLES REFERENCE STATION #A0

INCLUDING ELLIPTICITY

ANOMALY REGION = NORTHERN MID-ATLANTIC RIDGE
DISTANCE RANGE = 4778 TO 5087 KM AZIMUTH RANGE = 49.2 TO 54.4 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 19 JUL66 N ATL RIDGE | 4778.38 | S1.27 | -.021 | -.174 | .010 | .042 | 0 | -.176 | 0 | .019 | -.108 | -.504 |
| 09 MAR67 N ATLANTIC | 4821.12 | 49.84 | 0 | -.127 | .015 | .025 | -.063 | -.140 | -.313 | .101 | -.132 | 0 |
| 19 JUL66 N ATL OCEAN | 4839.34 | S1.30 | 0 | 0 | 0 | -.050 | 0 | 0 | 0 | 0 | -.149 | 0 |
| 9 MAR 67 N ATL OC. | 4858.92 | S0.29 | 0 | -.133 | .046 | .020 | .028 | -.006 | -.206 | .166 | -.136 | -.346 |
| 09 MAR67 N ATLANTIC | 4861.17 | S0.13 | -.048 | -.265 | -.014 | .012 | -.070 | -.139 | -.286 | -.002 | -.147 | -.461 |
| 10 MAR67 N ATLANTIC | 4862.58 | S0.43 | .043 | -.182 | -.014 | .019 | -.113 | -.124 | -.325 | .084 | -.196 | -.381 |
| 13 JUL66 N ATL OCEAN | 4868.67 | 49.17 | -.069 | -.194 | -.011 | -.061 | -.061 | -.123 | -.388 | -.028 | -.142 | 0 |
| 9 MAR 67 N ATL OC. | 4870.70 | S0.24 | 0 | -.164 | -.024 | -.020 | -.032 | -.097 | -.396 | .037 | -.218 | -.327 |
| 19 JUL66 N ATLNTC OC | 4878.89 | S1.27 | -.078 | 0 | -.096 | -.000 | 0 | 0 | 0 | .042 | 0 | -.483 |
| 08 APR66 N ATL OCEAN | 5086.57 | 54.36 | -.041 | -.285 | -.043 | .044 | -.098 | -.192 | -.429 | .017 | -.145 | -.503 |
| | AVERAGE | | -.036 | -.190 | -.015 | .015 | -.058 | -.125 | -.335 | .048 | -.153 | -.429 |
| | SIGMA | | .043 | .057 | .040 | .032 | .046 | .057 | .076 | .059 | .034 | .076 |
| | N | | 6 | 8 | 9 | 10 | 7 | 8 | 7 | 9 | 9 | 7 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 19 JUL66 N ATL RIDGE | 4778.38 | S1.27 | -.134 | -.000 | .008 | -.067 | -.439 | 0 | .260 | -.531 | 0 | -.361 |
| 09 MAR67 N ATLANTIC | 4821.12 | 49.84 | 0 | 0 | -.012 | -.069 | -.411 | 0 | .241 | -.463 | -.874 | -.317 |
| 19 JUL66 N ATL OCEAN | 4839.34 | S1.30 | 0 | 0 | 0 | -.128 | 0 | 0 | 0 | -.689 | 0 | 0 |
| 9 MAR 67 N ATL OC. | 4858.92 | S0.29 | .018 | .017 | -.010 | -.035 | -.389 | 0 | .253 | -.409 | 0 | -.313 |
| 09 MAR67 N ATLANTIC | 4861.17 | S0.13 | 0 | -.077 | .046 | -.087 | -.396 | 0 | .293 | -.609 | -.974 | -.383 |
| 10 MAR67 N ATLANTIC | 4862.58 | S0.43 | -.091 | -.028 | -.057 | -.036 | -.441 | 0 | .199 | -.463 | -.847 | -.310 |
| 13 JUL66 N ATL OCEAN | 4868.67 | 49.17 | -.170 | -.051 | -.026 | -.057 | -.433 | -.445 | .271 | -.439 | -.763 | -.377 |
| 9 MAR 67 N ATL OC. | 4870.70 | S0.24 | 0 | -.051 | -.041 | -.131 | -.448 | 0 | .126 | -.497 | 0 | -.357 |
| 19 JUL66 N ATLNTC OC | 4878.89 | S1.27 | -.190 | 0 | 0 | -.138 | -.493 | 0 | 0 | -.539 | 0 | 0 |
| 08 APR66 N ATL OCEAN | 5086.57 | 54.36 | -.168 | -.054 | .001 | -.122 | -.419 | -.360 | .256 | -.573 | -.748 | -.330 |
| | AVERAGE | | -.122 | -.036 | -.011 | -.087 | -.430 | -.402 | .228 | -.518 | -.841 | -.343 |
| | SIGMA | | .077 | .032 | .032 | .040 | .031 | .061 | .047 | .084 | .092 | .030 |
| | N | | 6 | 7 | 8 | 10 | 9 | 2 | 8 | 10 | 5 | 8 |

E V E N T P A R A M E T E R S

| 10 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 19 JUL66 N ATL RIDGE | 55.700 | -36.300 | 33 | 10 08 37.0 | .0328 | .001 | 16 |
| 09 MAR67 N ATLANTIC | 56.500 | -35.100 | 33 | 20 23 04. | .0322 | .018 | 15 |
| 19 JUL66 N ATL OCEAN | 55.500 | -35.400 | 33 | 00 20 11.0 | .1044 | -.066 | 4 |
| 9 MAR 67 N ATL OC. | 56.100 | -34.700 | 33 | 20 02 43.5 | .0823 | .067 | 17 |
| 09 MAR67 N ATLANTIC | 56.200 | -34.600 | 33 | 20 34 48. | .0512 | -.020 | 18 |
| 10 MAR67 N ATLANTIC | 56.000 | -34.700 | 33 | 11 14 38. | .0377 | .009 | 19 |
| 13 JUL66 N ATL OCEAN | 56.800 | -34.100 | 24 | 10 34 02.8 | .0430 | -.032 | 19 |
| 9 MAR 67 N ATL OC. | 56.100 | -34.500 | 33 | 22 18 00.7 | .0494 | -.013 | 16 |
| 19 JUL66 N ATLNTC OC | 55.400 | -34.800 | 33 | 02 05 06.0 | .0536 | -.044 | 9 |
| 08 APR66 N ATL OCEAN | 52.700 | -33.200 | 33 | 05 02 40.4 | .0515 | -.018 | 20 |

11 15 67

# RELATIVE TRAVEL-TIME ANOMALIES

HERRIN66TRAVEL-TIME TABLES — REFERENCE STATION A0

INCLUDING ELLIPTICITY

ANOMALY REGION = ICELAND
DISTANCE RANGE = 5059 TO 5384 KM AZIMUTH RANGE = 36.5 TO 41.4 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 05 MAY 66 ICELAND | 5050.50 | 41.27 | -.063 | -.126 | -.085 | -.070 | -.052 | -.171 | -.200 | 0 | -.129 | 0 |
| 05 MAY 66 ICELAND | 5062.16 | 41.40 | -.152 | -.185 | -.065 | -.083 | -.063 | -.209 | -.279 | -.060 | -.204 | 0 |
| 01 APR 67 ICELAND | 5383.90 | 36.51 | -.094 | -.129 | -.081 | -.103 | -.047 | -.008 | -.136 | -.008 | -.054 | -.304 |
| | AVERAGE | | -.103 | -.145 | -.020 | -.036 | -.067 | -.159 | -.205 | -.038 | -.127 | -.304 |
| | SIGMA | | .046 | .034 | .092 | .049 | .018 | .097 | .072 | .042 | .074 | 0 |
| | N | | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 1 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 05 MAY 66 ICELAND | 5050.50 | 41.27 | 0 | -.050 | -.112 | -.040 | -.344 | -.294 | -.221 | -.426 | -.504 | -.555 |
| 05 MAY 66 ICELAND | 5062.16 | 41.40 | -.202 | -.175 | -.097 | -.101 | -.357 | -.493 | -.039 | -.399 | -.582 | -.701 |
| 01 APR 67 ICELAND | 5383.90 | 36.51 | -.062 | -.027 | -.107 | -.149 | -.402 | -.382 | -.112 | -.582 | -.445 | -.480 |
| | AVERAGE | | -.132 | -.084 | -.105 | -.070 | -.360 | -.390 | -.031 | -.469 | -.577 | -.581 |
| | SIGMA | | .099 | .079 | .000 | .090 | .030 | .000 | .076 | .094 | .070 | .109 |
| | N | | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |

## EVENT PARAMETERS

| 3 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | RMS ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 05 MAY 66 ICELAND | 61.500 | -27.500 | 33 | 15 52 41.1 | .0566 | .039 | 17 |
| 05 MAY 66 ICELAND | 61.400 | -27.500 | 33 | 15 16 31.9 | .0631 | .035 | 19 |
| 01 APR 67 ICELAND | 63.700 | -18.900 | 2 | 12 41 [illegible].A | .0095 | .000 | 20 |

11 15 67 RELATIVE TRAVEL-TIME ANOMALIES

HERRIN68TRAVEL-TIME TABLES REFERENCE STATION A0

INCLUDING ELLIPTICITY

ANOMALY REGION = GREENLAND SEA
DISTANCE RANGE = 5774 TO 5804 KM AZIMUTH RANGE = 19.A TO 19.9 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 NOV 66 GRNLND SEA | 5774.0Y | 19.A1 | .011 | -.094 | .031 | -.028 | -.108 | -.194 | -.180 | -.033 | -.137 | 0 |
| 13 JUN 66 GRNLND SEA | 5799.31 | 19.A7 | 0 | .009 | .020 | -.039 | -.161 | -.090 | -.0A7 | .043 | -.084 | -.179 |
| 20 SEP66 GREENLAND S | 5802.94 | 19.A8 | 0 | -.123 | 0 | .070 | -.131 | -.123 | -.108 | 0 | -.169 | 0 |
| AVERAGE | | | .011 | -.069 | .026 | .027 | -.133 | -.136 | -.148 | .005 | -.130 | -.179 |
| SIGMA | | | 0 | .069 | .006 | .050 | .026 | .053 | .071 | .054 | .043 | 0 |
| N | | | 1 | 3 | 2 | 3 | 3 | 3 | 3 | 2 | 3 | 1 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 NOV 66 GRNLND SEA | 5774.0Y | 19.A1 | -.046 | -.138 | -.242 | -.504 | -.217 | -.180 | -.360 | -.634 | -.232 | -.403 |
| 13 JUN 66 GRNLND SEA | 5799.31 | 19.A7 | -.027 | -.047 | -.191 | -.313 | -.205 | -.265 | 0 | -.569 | -.269 | -.405 |
| 20 SEP66 GREENLAND S | 5802.94 | 19.A8 | -.144 | -.173 | 0 | -.449 | -.136 | -.353 | 0 | -.61A | -.369 | 0 |
| AVERAGE | | | -.079 | -.119 | -.217 | -.422 | -.186 | -.266 | -.360 | -.607 | -.290 | -.604 |
| SIGMA | | | .059 | .065 | .036 | .098 | .044 | .086 | 0 | .033 | .071 | .002 |
| N | | | 3 | 3 | 2 | 3 | 3 | 3 | 1 | 3 | 3 | 2 |

EVENT PARAMETERS

| J EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 30 NOV 66 GRNLND SEA | 73.400 | 7.000 | 33 | 13 00 40.0 | .0411 | -.011 | 19 |
| 13 JUN 66 GRNLND SEA | 73.100 | 7.200 | 63 | 13 19 35.0 | .0495 | .031 | 18 |
| 20 SEP66 GREENLAND S | 73.200 | 7.600 | 33 | 23 06 38.0 | .0524 | -.027 | 13 |

11 15 67 R E L A T I V E T R A V E L - T I M E A N O M A L I E S

HERRIN68TRAVEL-TIME TABLES REFERENCE STATION A0

INCLUDING ELLIPTICITY

ANOMALY REGION = AZORES IS
DISTANCE RANGE = 6005 TO 6521 KM AZIMUTH RANGE = 65.3 TO 70.3 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 04 APR66 AZORES IS 2 | 6004.81 | 70.11 | -.045 | -.163 | .010 | .150 | .122 | -.148 | -.346 | .172 | -.005 | -.314 |
| 04 APR66 AZORES IS 1 | 6024.69 | 70.25 | 0 | -.262 | -.169 | .108 | -.032 | -.168 | -.303 | .172 | -.089 | -.421 |
| 04 JUL66 AZORES | 6476.86 | 65.25 | 0 | -.218 | -.119 | 0 | 0 | -.121 | -.356 | .147 | 0 | -.401 |
| 04 JUL 66 AZORES IS | 6513.74 | 67.16 | .038 | -.103 | .003 | .114 | .126 | -.126 | -.342 | .129 | .077 | -.370 |
| 05 JUL 66 AZORES IS | 6521.14 | 66.95 | -.011 | -.145 | -.058 | .146 | .249 | -.058 | -.275 | .181 | .039 | -.335 |
| AVERAGE | | | -.008 | -.178 | -.067 | .129 | .116 | -.134 | -.342 | .160 | .005 | -.368 |
| SIGMA | | | .042 | .062 | .077 | .021 | .115 | .053 | .043 | .029 | .071 | .044 |
| N | | | 3 | 5 | 5 | 4 | 4 | 5 | 5 | 5 | 4 | 5 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | F3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 04 APR66 AZORES IS 2 | 6004.81 | 70.11 | -.244 | .033 | .044 | -.162 | -.486 | -.401 | .121 | -.771 | -.660 | -.280 |
| 04 APR66 AZORES IS 1 | 6024.69 | 70.25 | -.229 | .038 | -.007 | -.301 | -.434 | -.340 | 0 | -.746 | -.661 | -.302 |
| 04 JUL66 AZORES | 6476.86 | 65.25 | 0 | 0 | .136 | -.284 | -.510 | 0 | 0 | -.874 | 0 | 0 |
| 04 JUL 66 AZORES IS | 6513.74 | 67.16 | -.215 | .028 | .090 | -.143 | -.347 | -.252 | .085 | -.594 | 0 | -.267 |
| 05 JUL 66 AZORES IS | 6521.14 | 66.95 | -.167 | 0 | .081 | 0 | -.389 | -.286 | .215 | -.677 | 0 | -.246 |
| AVERAGE | | | -.212 | .033 | .069 | -.223 | -.433 | -.320 | .140 | -.732 | -.661 | -.274 |
| SIGMA | | | .032 | .005 | .054 | .062 | .067 | .065 | .067 | .105 | .001 | .024 |
| N | | | 4 | 3 | 5 | 4 | 5 | 4 | 3 | 5 | 2 | 4 |

E V E N T P A R A M E T E R S

| 5 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 04 APR66 AZORES IS 2 | 38.200 | -31.300 | 33 | 20 48 38.8 | .0410 | -.006 | 20 |
| 04 APR66 AZORES IS 1 | 38.000 | -31.200 | 33 | 20 44 56.3 | .0637 | -.044 | 18 |
| 04 JUL66 AZORES | 39.000 | -23.900 | 33 | 23 49 53.0 | .0671 | -.035 | 10 |
| 04 JUL 66 AZORES IS | 37.500 | -24.800 | 33 | 12 15 28.1 | .0577 | .030 | 19 |
| 05 JUL 66 AZORES IS | 37.600 | -24.600 | 12 | 05 09 03.6 | .0541 | .042 | 17 |

11 15 67

# RELATIVE TRAVEL-TIME ANOMALIES

HERRIN66 TRAVEL-TIME TABLES — REFERENCE STATION A0

INCLUDING ELLIPTICITY

ANOMALY REGION = YUGOSLAVIA, ALBANIA, GREECE, MED, SEA
DISTANCE RANGE = 8759 TO 9399 KM  AZIMUTH RANGE = 37.0 TO 40.1 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | G1 | D1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 AUG66 YUGOSLAVIA | 8759.31 | 38.38 | -.198 | -.262 | -.020 | .015 | -.114 | -.230 | -.360 | .017 | -.243 | -.655 |
| 06 AUG66 YUGOSLAVIA | 8777.90 | 38.32 | -.060 | -.332 | .052 | .055 | -.097 | -.432 | -.300 | .070 | -.207 | -.645 |
| 8 DEC 66 YUGOSLAVIA | 8782.65 | 38.26 | -.030 | -.313 | .022 | .075 | -.027 | 0 | -.378 | .029 | 0 | 0 |
| 25 MAY 66 ALBANIA | 8985.61 | 38.61 | 0 | -.348 | -.020 | .015 | -.041 | -.369 | -.372 | .149 | -.223 | -.601 |
| 09 AUG66 ALBANIA | 9003.97 | 38.72 | -.135 | -.267 | .000 | .014 | 0 | 0 | -.340 | .000 | -.185 | 0 |
| 16 AUG66 ALBANIA | 9003.97 | 38.72 | -.079 | -.207 | .060 | .104 | -.093 | -.339 | 0 | .158 | -.165 | -.378 |
| 9 FEB 67 GREECE-ALB | 9050.68 | 38.64 | -.048 | -.298 | .082 | -.063 | -.047 | -.432 | -.358 | .150 | -.233 | -.588 |
| 1 MAY 67 GREECE | 9125.93 | 38.16 | -.165 | -.319 | -.013 | -.047 | -.034 | -.301 | -.355 | .086 | -.491 | -.566 |
| 29 OCT 66 GREECE | 9167.51 | 38.50 | -.068 | -.327 | .068 | .049 | -.040 | -.330 | -.200 | .124 | -.106 | -.537 |
| 3 APR 66 GREECE | 9200.33 | 38.41 | -.061 | -.297 | .010 | .048 | -.064 | -.203 | -.277 | .095 | -.204 | -.577 |
| 4 MAY 66 GREECE | 9205.27 | 38.16 | -.143 | 0 | .022 | .029 | -.075 | 0 | -.398 | .010 | -.298 | 0 |
| 05 FEB66 GREECE 1 | 9205.41 | 37.98 | -.063 | -.289 | .032 | .050 | -.034 | -.348 | -.239 | .100 | -.150 | -.595 |
| 05 FEB66 GREECE 2 | 9214.82 | 37.84 | -.105 | -.300 | .063 | .080 | -.075 | -.311 | -.318 | .122 | -.253 | 9 |
| 11 JUN66 S. GREECE | 9325.04 | 39.44 | -.160 | -.289 | .035 | .047 | -.006 | -.310 | -.391 | .108 | -.206 | 9 |
| 04 JUN66 MEDITRN SEA | 9398.66 | 40.07 | 0 | 0 | .087 | .040 | 0 | 0 | 0 | .155 | -.160 | -.564 |
| | AVERAGE | | -.101 | -.296 | .032 | .042 | -.051 | -.328 | -.330 | .084 | -.217 | -.576 |
| | SIGMA | | .053 | .036 | .036 | .035 | .033 | .071 | .040 | .050 | .072 | .052 |
| | N | | 13 | 13 | 15 | 15 | 13 | 11 | 13 | 15 | 14 | 10 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 AUG66 YUGOSLAVIA | 8759.31 | 38.38 | -.075 | -.119 | -.144 | -.579 | -.430 | -.295 | -.243 | -.772 | -.582 | -.548 |
| 06 AUG66 YUGOSLAVIA | 8777.90 | 38.32 | -.071 | -.070 | 0 | 0 | -.694 | 0 | 0 | -.782 | -.587 | -.597 |
| 8 DEC 66 YUGOSLAVIA | 8782.65 | 38.26 | -.221 | 0 | -.229 | -.660 | 0 | -.286 | -.211 | 0 | -.486 | -.372 |
| 25 MAY 66 ALBANIA | 8985.61 | 38.61 | -.071 | .035 | 9 | -.584 | 0 | -.205 | -.178 | 0 | -.535 | -.368 |
| 09 AUG66 ALBANIA | 9003.97 | 38.72 | -.189 | 0 | 0 | -.531 | 0 | 0 | -.109 | -.813 | -.573 | -.438 |
| 16 AUG66 ALBANIA | 9003.97 | 38.72 | -.099 | .100 | -.107 | -.481 | 0 | -.197 | 0 | 0 | -.503 | -.368 |
| 9 FEB 67 GREECE-ALB | 9050.68 | 38.64 | -.083 | .009 | -.266 | -.542 | -.710 | -.167 | -.105 | -.822 | -.420 | -.408 |
| 1 MAY 67 GREECE | 9125.93 | 38.16 | -.118 | -.067 | -.182 | -.540 | -.495 | -.205 | -.213 | 0 | -.542 | -.325 |
| 29 OCT 66 GREECE | 9167.51 | 38.50 | -.092 | .011 | -.152 | -.559 | -.481 | -.180 | -.180 | -.687 | -.499 | -.388 |
| 3 APR 66 GREECE | 9200.33 | 38.41 | -.036 | -.011 | 0 | -.449 | -.529 | -.190 | -.416 | -.645 | -.603 | -.470 |
| 4 MAY 66 GREECE | 9205.27 | 38.16 | -.183 | -.086 | -.141 | -.635 | -.571 | -.369 | -.307 | -.783 | -.735 | -.503 |
| 05 FEB66 GREECE 1 | 9205.41 | 37.98 | -.142 | -.022 | -.198 | -.564 | -.596 | -.262 | -.159 | -.788 | -.639 | -.378 |
| 05 FEB66 GREECE 2 | 9214.82 | 37.84 | -.129 | -.060 | -.219 | -.533 | -.575 | -.264 | -.248 | -.895 | -.505 | -.431 |
| 11 JUN66 S. GREECE | 9325.04 | 39.44 | -.186 | -.077 | -.151 | -.563 | 0 | -.281 | -.311 | -.722 | -.961 | -.425 |
| 04 JUN66 MEDITRN SEA | 9398.66 | 40.07 | -.113 | 0 | -.154 | -.479 | -.545 | -.237 | -.306 | -.784 | -.572 | -.428 |
| | AVERAGE | | -.120 | -.030 | -.177 | -.551 | -.575 | -.241 | -.237 | -.768 | -.598 | -.487 |
| | SIGMA | | .054 | .062 | .047 | .052 | .066 | .058 | .041 | .064 | .072 | .068 |
| | N | | 15 | 12 | 11 | 14 | 10 | 13 | 13 | 11 | 14 | 15 |

## EVENT PARAMETERS

| 15 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 20 AUG66 YUGOSLAVIA | 42.300 | 18.600 | 22 | 12 05 18.9 | .0629 | -.032 | 20 |
| 06 AUG66 YUGOSLAVIA | 42.200 | 18.800 | 33 | 12 31 98.0 | .0552 | -.023 | 16 |
| 8 DEC 66 YUGOSLAVIA | 42.200 | 18.900 | 24 | 11 31 18.0 | .0607 | -.013 | 14 |
| 25 MAY 66 ALBANIA | 40.500 | 19.900 | 33 | 09 06 59.0 | .0440 | .007 | 16 |
| 09 AUG66 ALBANIA | 40.300 | 19.900 | 33 | 03 34 14.3 | .0495 | -.005 | 13 |
| 16 AUG66 ALBANIA | 40.300 | 19.900 | 83 | 03 53 42.8 | .0621 | .050 | 16 |
| 9 FEB 67 GREECE-ALB | 40.000 | 20.300 | 3 | 14 08 18.7 | .0643 | .005 | 29 |
| 1 MAY 67 GREECE | 39.700 | 21.300 | 10 | 07 08 00.5 | .0627 | -.008 | 19 |
| 29 OCT 66 GREECE | 39.200 | 21.200 | 20 | 02 39 29.4 | .0609 | .043 | 20 |
| 3 APR 66 GREECE | 39.000 | 21.500 | 25 | 11 36 24.8 | .0742 | .020 | 18 |
| 4 MAY 66 GREECE | 39.100 | 21.800 | 41 | 06 36 59.8 | .0764 | -.056 | 17 |
| 05 FEB66 GREECE 1 | 39.200 | 22.000 | 88 | 02 01 48.3 | .0416 | .008 | 20 |
| 05 FEB66 GREECE 2 | 39.200 | 22.200 | 45 | 02 98 00.8 | .0332 | -.004 | 19 |
| 11 JUN66 S. GREECE | 37.500 | 21.200 | 51 | 12 05 03.2 | .0394 | -.010 | 18 |
| 04 JUN66 MEDITRN SEA | 36.600 | 21.000 | 80 | 06 16 57.4 | .0414 | .015 | 14 |

11 15 67 RELATIVE TRAVEL-TIME ANOMALIES

HERRIN66 TRAVEL-TIME TABLES INCLUDING ELLIPTICITY REFERENCE STATION A0

ANOMALY REGION = MISC. RUMANIA, BULGARIA, TURKEY
DISTANCE RANGE = 8701 TO 9981 KM AZIMUTH RANGE = 29.1 TO 34.8 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 OCT66 RUMANIA | 8701.35 | 31.75 | -.100 | -.212 | .046 | -.309 | -.141 | -.269 | -.266 | .039 | -.268 | -.674 |
| 2 OCT 66 RUMANIA | 8789.40 | 31.63 | -.094 | -.222 | .028 | -.109 | -.143 | -.207 | -.169 | .070 | -.273 | -.626 |
| 08 FEB66 GREECE-BULG | 9139.45 | 34.77 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 APR 67 TURKEY | 9981.22 | 29.06 | -.081 | -.138 | .099 | -.004 | .073 | -.129 | -.197 | .185 | -.130 | -.543 |
| AVERAGE | | | -.095 | -.191 | .058 | -.038 | -.070 | -.200 | -.196 | .078 | -.224 | -.614 |
| SIGMA | | | .013 | .046 | .037 | .062 | .124 | .068 | .061 | .844 | .081 | .066 |
| N | | | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 OCT66 RUMANIA | 8701.35 | 31.75 | -.113 | -.087 | -.231 | -.639 | -.531 | -.382 | -.405 | -1.011 | -.699 | -.613 |
| 2 OCT 66 RUMANIA | 8789.40 | 31.63 | -.130 | -.086 | -.215 | -.598 | -.548 | -.365 | 0 | 0 | -.666 | -.600 |
| 08 FEB66 GREECE-BULG | 9139.45 | 34.77 | 0 | 0 | -.329 | 0 | -.576 | 0 | -.237 | 0 | -.649 | -.473 |
| 7 APR 67 TURKEY | 9981.22 | 29.06 | -.160 | -.083 | -.106 | -.962 | -.583 | -.383 | 0 | 0 | -.587 | -.479 |
| AVERAGE | | | -.134 | -.085 | -.220 | -.600 | -.560 | -.377 | -.321 | -1.011 | -.640 | -.543 |
| SIGMA | | | .024 | .002 | .091 | .039 | .024 | .010 | .119 | 0 | .836 | .077 |
| N | | | 3 | 3 | 4 | 3 | 4 | 3 | 2 | 1 | 4 | 4 |

EVENT PARAMETERS

| 4 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 15 OCT66 RUMANIA | 45.700 | 26.300 | 100 | 06 59 16.9 | .0447 | .030 | 20 |
| 2 OCT 66 RUMANIA | 45.700 | 26.500 | 140 | 11 21 44.9 | .0351 | .009 | 18 |
| 08 FEB66 GREECE-BULG | 41.400 | 25.100 | 33 | 20 08 06.3 | .0777 | .004 | 5 |
| 7 APR 67 TURKEY | 37.400 | 36.200 | 39 | 18 33 31.3 | .0652 | .042 | 18 |

11 15 67

# RELATIVE TRAVEL-TIME ANOMALIES

HERRIN66 TRAVEL-TIME TABLES — INCLUDING ELLIPTICITY — REFERENCE STATION A0

ANOMALY REGION = CAUCASUS
DISTANCE RANGE = 9316 TO 9988 KM AZIMUTH RANGE = 18.9 TO 25.3 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 JUL66 W. CAUCASUS | 9315.67 | 25.32 | -.001 | -.138 | -.007 | -.034 | -.172 | -.254 | -.249 | -.031 | -.032 | -.408 |
| 02 MAR66 E. CAUCASUS | 9709.17 | 20.15 | -.011 | -.146 | .008 | .018 | -.136 | -.167 | -.181 | -.070 | -.081 | -.410 |
| 30 JAN 67 W CAUCASUS | 9974.89 | 21.94 | -.079 | -.164 | .004 | -.124 | -.167 | -.128 | -.159 | -.078 | -.124 | -.411 |
| 20 APR66 E CAUCASUS | 9907.88 | 18.87 | -.015 | -.149 | .028 | .066 | -.140 | -.174 | -.165 | .011 | -.086 | 0 |
| | AVERAGE | | -.027 | -.149 | .008 | -.019 | -.154 | -.181 | -.189 | -.042 | -.081 | -.410 |
| | SIGMA | | .038 | .011 | .014 | .081 | .018 | .053 | .041 | .041 | .038 | .002 |
| | N | | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 3 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 JUL66 W. CAUCASUS | 9315.67 | 25.32 | -.084 | 0 | 0 | -.432 | -.363 | -.394 | -.346 | -.859 | -.731 | -.884 |
| 02 MAR66 E. CAUCASUS | 9709.17 | 20.15 | -.154 | -.080 | -.179 | -.493 | -.492 | -.494 | -.399 | -.870 | -.843 | -.962 |
| 30 JAN 67 W CAUCASUS | 9974.89 | 21.94 | -.107 | -.154 | -.237 | -.515 | -.536 | -.467 | -.398 | -.738 | -.756 | -.638 |
| 20 APR66 E CAUCASUS | 9907.88 | 18.87 | -.237 | -.046 | .086 | -.371 | -.482 | -.586 | -.315 | 0 | -.878 | -.960 |
| | AVERAGE | | -.146 | -.093 | -.167 | -.443 | -.503 | -.475 | -.365 | -.822 | -.802 | -1611 |
| | SIGMA | | .067 | .059 | .076 | .059 | .127 | .081 | .041 | .073 | .070 | .860 |
| | N | | 4 | 3 | 3 | 4 | 4 | 4 | 4 | 3 | 4 | 4 |

## EVENT PARAMETERS

| 4 EPICENTERS | LAYITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 12 JUL66 W. CAUCASUS | 44.400 | 37.400 | 24 | 18 53 08.5 | .0570 | .011 | 18 |
| 02 MAR66 E. CAUCASUS | 43.000 | 45.800 | 24 | 02 37 02.3 | .0272 | .002 | 20 |
| 30 JAN 67 W CAUCASUS | 41.000 | 44.200 | 33 | 01 20 31.7 | .0504 | -.015 | 20 |
| 20 APR66 E CAUCASUS | 41.700 | 46.200 | 19 | 16 42 03.7 | .0694 | .004 | 18 |

11 15 67 RELATIVE TRAVEL-TIME ANOMALIES

HERRIN66 TRAVEL-TIME TABLES REFERENCE STATION A8

INCLUDING ELLIPTICITY

ANOMALY REGION = CRETE, W, TURKEY
DISTANCE RANGE = 9466 TO 9865 KM AZIMUTH RANGE = 32.7 TO 39.2 DEGREES

| | EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 07 | MAY66 TURKEY | 9605.95 | 34.74 | -.054 | -.242 | .078 | .118 | .029 | -.315 | -.274 | .109 | -.203 | -.512 |
| 19 | NOV 66 CRETE | 9670.14 | 39.22 | -.005 | -.117 | .098 | .076 | -.102 | -.338 | -.349 | .127 | -.178 | -.493 |
| 22 | JAN 66 TURKEY | 9705.62 | 33.33 | -.064 | -.229 | .068 | .044 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | APR 66 CRETE | 9741.42 | 39.14 | -.129 | -.247 | .012 | .054 | -.037 | 0 | -.306 | .059 | -.278 | 0 |
| 28 | NOV65 DODECANESE | 9760.98 | 35.72 | -.080 | -.245 | .053 | .121 | -.020 | -.321 | -.280 | .192 | -.019 | -.417 |
| 8 | FEB 66 DODEC IS | 9763.91 | 35.27 | -.052 | -.238 | -.036 | .033 | -.087 | -.396 | -.372 | .014 | -.212 | 0 |
| 11 | MAR66 CRETE | 9770.14 | 38.91 | -.181 | -.288 | 0 | -.085 | -.088 | -.337 | -.246 | .019 | -.243 | -.516 |
| 09 | MAY66 TURKEY | 9804.62 | 32.72 | -.083 | -.178 | .184 | .183 | .025 | -.185 | -.259 | .140 | -.081 | -.481 |
| 21 | APR66 CRETE | 9807.96 | 37.57 | -.087 | -.265 | -.011 | .061 | -.037 | -.382 | -.370 | .045 | -.178 | 0 |
| 9 | MAY 66 CRETE | 9859.91 | 37.37 | -.099 | -.336 | -.058 | .111 | -.089 | -.436 | -.339 | .077 | -.225 | -.583 |
| 9 | MAY 66 CRETE | 9864.55 | 37.38 | -.040 | -.256 | .101 | .071 | .051 | -.367 | -.329 | .158 | -.186 | -.605 |
| | | AVERAGE | | -.058 | -.239 | .040 | .062 | -.036 | -.341 | -.308 | .093 | -.180 | -.567 |
| | | SIGMA | | .044 | .057 | .057 | .040 | .056 | .071 | .042 | .061 | .077 | .064 |
| | | N | | 11 | 11 | 10 | 11 | 10 | 9 | 10 | 10 | 10 | 7 |

| | EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | 23 | 24 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 07 | MAY66 TURKEY | 9605.95 | 34.74 | -.062 | -.025 | -.087 | -.401 | -.441 | -.255 | -.279 | 0 | -.589 | -.348 |
| 19 | NOV 66 CRETE | 9670.14 | 39.22 | -.116 | -.041 | -.059 | -.398 | -.495 | -.198 | -.331 | -.756 | -.545 | -.305 |
| 22 | JAN 66 TURKEY | 9705.62 | 33.33 | 0 | 0 | -.263 | -.272 | -.683 | -.312 | 0 | -.943 | -.670 | -.499 |
| 14 | APR 66 CRETE | 9741.42 | 39.14 | 0 | -.184 | -.144 | -.372 | -.421 | -.286 | 0 | -.673 | -.514 | -.437 |
| 28 | NOV65 DODECANESE | 9760.98 | 35.72 | -.017 | .033 | -.055 | -.421 | -.568 | -.191 | -.279 | -.598 | 0 | -.434 |
| 8 | FEB 66 DODEC IS | 9763.91 | 35.27 | 0 | -.048 | -.258 | -.613 | -.597 | -.295 | -.295 | 0 | 0 | -.583 |
| 11 | MAR66 CRETE | 9770.14 | 38.91 | 0 | -.041 | -.245 | -.546 | -.711 | -.415 | -.344 | -.826 | -.614 | -.484 |
| 09 | MAY66 TURKEY | 9804.62 | 32.72 | -.095 | .057 | -.094 | -.593 | -.595 | -.317 | -.305 | -.883 | -.772 | -.469 |
| 21 | APR66 CRETE | 9807.96 | 37.57 | -.143 | -.087 | -.132 | -.433 | -.621 | -.323 | -.320 | -.888 | -.711 | -.447 |
| 9 | MAY 66 CRETE | 9859.91 | 37.37 | -.080 | .085 | -.167 | -.599 | -.517 | -.242 | -.293 | -.717 | -.715 | -.508 |
| 9 | MAY 66 CRETE | 9864.55 | 37.38 | -.098 | -.024 | -.067 | -.473 | 0 | -.219 | -.285 | -.669 | -.523 | -.373 |
| | | AVERAGE | | -.083 | -.028 | -.146 | -.461 | -.557 | -.270 | -.303 | -.772 | -.628 | -.435 |
| | | SIGMA | | .041 | .061 | .085 | .106 | .088 | .069 | .023 | .119 | .093 | .067 |
| | | N | | 7 | 10 | 11 | 11 | 10 | 11 | 9 | 9 | 9 | 11 |

EVENT PARAMETERS

| | 11 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | 2HDCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|---|
| 07 | MAY66 TURKEY | 37.300 | 27.900 | 12 | 13 08 16.0 | .0494 | .035 | 19 |
| 19 | NOV 66 CRETE | 35.490 | 23.580 | 83 | 07 12 39.7 | .0681 | .025 | 20 |
| 22 | JAN 66 TURKEY | 37.710 | 30.880 | 23 | 00 23 42.7 | .0948 | -.025 | 11 |
| 14 | APR 66 CRETE | 34.500 | 24.080 | 83 | 16 51 46.8 | .0718 | .011 | 16 |
| 28 | NOV65 DODECANESE | 36.180 | 27.780 | 89 | 05 26 05.6 | .0787 | .052 | 19 |
| 8 | FEB 66 DODEC IS | 36.388 | 28.200 | 58 | 13 16 21.8 | .0784 | -.051 | 16 |
| 11 | MAR66 CRETE | 34.488 | 24.488 | 24 | 20 01 43.8 | .0753 | -.047 | 18 |
| 09 | MAY66 TURKEY | 37.280 | 31.280 | 125 | 03 51 09.4 | .1789 | .019 | 28 |
| 21 | APR66 CRETE | 34.880 | 26.888 | 82 | 06 45 29.8 | .0521 | -.036 | 19 |
| 9 | MAY 66 CRETE | 34.980 | 26.588 | 33 | 08 42 55.6 | .0671 | -.031 | 28 |
| 9 | MAY 66 CRETE | 34.900 | 26.688 | 83 | 06 58 28.5 | .0556 | .030 | 19 |

11 15 67

# RELATIVE TRAVEL-TIME ANOMALIES

HEPRIN66 TRAVEL-TIME TABLES — INCLUDING ELLIPTICITY — REFERENCE STATION A0

ANOMALY REGION = EASTERN TURKEY
DISTANCE RANGE = 9951 TO 10641 KM  AZIMUTH RANGE = 23.1 TO 24.9 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 AUG66 TURKEY | 9950.81 | 24.91 | -.038 | -.089 | .084 | .043 | -.042 | -.195 | -.249 | -.006 | -.104 | -.467 |
| 19 AUG66 TURKEY 2 | 9967.55 | 24.81 | -.049 | -.109 | .045 | .003 | -.013 | -.196 | -.269 | -.015 | -.127 | -.478 |
| 19 AUG66 TURKEY 3 | 9967.55 | 24.81 | -.049 | -.129 | .055 | -.007 | -.083 | -.276 | -.229 | -.039 | -.117 | -.508 |
| 19 AUG66 TURKEY 1 | 9986.66 | 24.37 | -.072 | -.091 | .087 | -.006 | -.034 | -.132 | -.109 | -.001 | -.124 | -.424 |
| 07 MAR66 TURKEY | 9997.00 | 24.41 | -.083 | -.201 | .014 | -.057 | -.096 | -.212 | -.206 | -.051 | -.146 | -.411 |
| 19 AUG 66 TURKEY | 10017.67 | 24.48 | -.024 | -.150 | .028 | -.038 | -.028 | -.172 | -.195 | -.012 | -.037 | -.439 |
| 27 APR 66 TURKEY | 10121.59 | 24.00 | -.043 | -.076 | .084 | -.053 | -.077 | -.154 | -.200 | -.047 | -.104 | -.491 |
| 14 JUN 66 TURKEY | 10135.08 | 23.96 | .017 | -.117 | .042 | -.067 | -.010 | -.192 | -.213 | -.047 | -.102 | -.474 |
| 02 MAY 66 TURKEY | 10139.22 | 24.15 | -.072 | -.106 | .022 | -.067 | -.016 | -.160 | -.293 | -.039 | -.036 | 0 |
| 11 JAN 66 IRAQ-IRAN | 10441.21 | 23.11 | -.064 | -.148 | .056 | -.040 | -.042 | -.137 | -.203 | .000 | -.138 | 0 |
| AVERAGE | | | -.048 | -.122 | .034 | -.029 | -.049 | -.183 | -.207 | -.025 | -.105 | -.468 |
| SIGMA | | | .029 | .037 | .026 | .036 | .030 | .042 | .040 | .021 | .041 | .034 |
| N | | | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 8 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 AUG66 TURKEY | 9950.81 | 24.91 | -.098 | -.039 | -.082 | -.507 | 0 | -.428 | -.239 | -.884 | -.776 | -.574 |
| 19 AUG66 TURKEY 2 | 9967.55 | 24.81 | -.136 | -.138 | -.213 | -.523 | -.491 | -.393 | -.403 | -.809 | -.710 | -.509 |
| 19 AUG66 TURKEY 3 | 9967.55 | 24.81 | -.166 | -.148 | -.139 | -.463 | -.513 | -.403 | 0 | -.936 | -.797 | 0 |
| 19 AUG66 TURKEY 1 | 9986.66 | 24.37 | -.090 | -.022 | -.193 | -.465 | -.490 | -.409 | -.310 | -.867 | -.775 | -.549 |
| 07 MAR66 TURKEY | 9997.00 | 24.41 | -.101 | -.085 | -.197 | -.465 | -.497 | -.472 | -.300 | -.843 | -.639 | -.590 |
| 19 AUG 66 TURKEY | 10017.67 | 24.48 | -.126 | -.128 | -.092 | -.523 | -.603 | -.499 | -.291 | -.873 | -.779 | -.569 |
| 27 APR 66 TURKEY | 10121.59 | 24.00 | -.127 | -.110 | -.179 | -.443 | -.620 | -.463 | -.458 | -.936 | 0 | -.469 |
| 14 JUN 66 TURKEY | 10135.08 | 23.96 | -.171 | -.089 | -.117 | -.446 | -.728 | -.464 | -.258 | -.933 | -.849 | -.576 |
| 02 MAY 66 TURKEY | 10139.22 | 24.15 | -.162 | -.078 | -.242 | -.467 | -.623 | -.531 | -.194 | -1.008 | -.816 | -.581 |
| 11 JAN 66 IRAQ-IRAN | 10441.21 | 23.11 | -.172 | -.107 | -.290 | -.478 | -.591 | -.506 | -.243 | -.884 | -.896 | -.720 |
| AVERAGE | | | -.137 | -.095 | -.166 | -.478 | -.569 | -.492 | -.329 | -.895 | -.782 | -.583 |
| SIGMA | | | .032 | .041 | .060 | .029 | .088 | .049 | .126 | .058 | .075 | .089 |
| N | | | 10 | 10 | 10 | 10 | 9 | 10 | 9 | 10 | 9 | 9 |

## EVENT PARAMETERS

| 10 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 20 AUG66 TURKEY | 39.300 | 40.900 | 37 | 11 99 12.1 | .0413 | .020 | 19 |
| 19 AUG66 TURKEY 2 | 39.200 | 41.100 | 33 | 13 19 10.1 | .0506 | .009 | 20 |
| 19 AUG66 TURKEY 3 | 39.200 | 41.100 | 47 | 14 17 57.5 | .0389 | -.011 | 18 |
| 19 AUG66 TURKEY 1 | 39.200 | 41.700 | 26 | 12 22 09.6 | .0428 | .030 | 20 |
| 07 MAR66 TURKEY | 39.100 | 41.700 | 13 | 01 16 05.8 | .0519 | .001 | 20 |
| 19 AUG 66 TURKEY | 38.900 | 41.700 | 33 | 13 94 24.9 | .0323 | .006 | 20 |
| 27 APR 66 TURKEY | 38.200 | 42.700 | 85 | 19 48 49.8 | .0479 | -.006 | 19 |
| 14 JUN 66 TURKEY | 38.100 | 42.800 | 38 | 02 45 57.0 | .0508 | -.008 | 20 |
| 02 MAY 66 TURKEY | 38.000 | 42.600 | 41 | 23 12 23.0 | .0679 | -.009 | 19 |
| 11 JAN 66 IRAQ-IRAN | 34.100 | 45.700 | 84 | 11 20 45.7 | .0799 | -.034 | 19 |

11 15 67 R E L A T I V E T R A V E L - T I M E A N O M A L I E S

HERRIN68 TRAVEL-TIME TABLES REFERENCE STATION A0

INCLUDING ELLIPTICITY

ANOMALY REGION = N ATLANTIC RIDGE
DISTANCE RANGE = 5713 TO 5810 KM AZIMUTH RANGE = 75.9 TO 83.0 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 NOV65 N ATL RIDGE | 5713.42 | 83.62 | 0 | 0 | 0 | 0 | -.160 | 0 | -.324 | 0 | .257 | -.543 |
| 15 JUL66 N ATLNTC RD | 5809.58 | 75.90 | 0 | -.233 | 0 | 0 | 0 | 0 | 0 | .275 | 0 | -.350 |
| 10 JUN 66 N ATL RUG | 5716.50 | 80.57 | 0 | -.145 | .002 | -.087 | .386 | -.018 | -.362 | .229 | .374 | -.385 |
| AVERAGE | | | 0 | -.189 | .002 | -.087 | .113 | -.018 | -.345 | .252 | .316 | -.426 |
| SIGMA | | | 0 | .003 | 0 | 0 | .386 | 0 | .024 | .033 | .003 | .103 |
| N | | | 0 | 2 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 3 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 NOV65 N ATL RIDGE | 5713.42 | 83.62 | -.210 | .521 | 0 | 0 | -.438 | .073 | .238 | -.930 | -.531 | 0 |
| 15 JUL66 N ATLNTC RD | 5809.58 | 75.90 | 0 | 0 | 0 | -.243 | 0 | 0 | 0 | 0 | -.610 | 0 |
| 10 JUN 66 N ATL RUG | 5716.50 | 80.57 | -.185 | .417 | .235 | -.389 | -.486 | -.003 | 0 | -.963 | -.566 | -.443 |
| AVERAGE | | | -.197 | .469 | .235 | -.306 | -.512 | .035 | .238 | -.959 | -.569 | -.443 |
| SIGMA | | | .032 | .074 | 0 | .089 | .037 | .053 | 0 | .033 | .039 | 0 |
| N | | | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 3 | 1 |

E V E N T P A R A M E T E R S

| 3 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 16 NOV65 N ATL RIDGE | 31.000 | -41.500 | 17 | 15 24 42.9 | .0997 | -.030 | 11 |
| 15 JUL66 N ATLNTC RD | 35.400 | -36.400 | 33 | 02 26 15.0 | .0590 | .015 | 5 |
| 10 JUN 66 N ATL RUG | 32.900 | -39.800 | 0 | 22 14 37.3 | .0737 | .014 | 10 |

11 15 67 R E L A T I V E T R A V E L - T I M E A N O M A L I E S

HERRIN66 TRAVEL-TIME TABLES REFERENCE STATION AO

INCLUDING ELLIPTICITY

ANOMALY REGION = CENTRAL MID-ATLANTIC RIDGE
DISTANCE RANGE = 6365 TO 7946 KM AZIMUTH RANGE = 99.7 TO 102.1 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22 SEP66 N ATL RIDGE | 6367.79 | 100.78 | .019 | 0 | .067 | .217 | .283 | .026 | -.223 | .297 | .164 | 0 |
| 25 JUL66 N ATLNTC RD | 6926.82 | 102.05 | 0 | -.177 | .093 | .176 | 0 | -.006 | 0 | .311 | 0 | -.285 |
| 17 DEC 65 MID ATL RG | 7946.80 | 101.43 | 0 | 0 | 0 | .163 | .217 | -.159 | -.276 | .275 | .239 | -.393 |
| 17 DEC 65 MID ATL RG | 7553.26 | 101.05 | 0 | 0 | 0 | .196 | .103 | -.199 | -.121 | .226 | .269 | -.460 |
| 17 DEC65 MID ATL RDG | 7553.82 | 101.20 | 0 | 0 | 0 | 0 | .170 | -.149 | -.309 | .336 | .096 | -.418 |
| 03 JUN 66 MID ATL RG | 7946.36 | 99.66 | 0 | -.242 | -.090 | .079 | .047 | 0 | -.139 | .191 | .283 | -.433 |
| | AVERAGE | | .019 | -.210 | .010 | .165 | .164 | -.097 | -.220 | .273 | .209 | -.390 |
| | SIGMA | | 0 | .046 | .087 | .054 | .092 | .100 | .075 | .054 | .078 | .071 |
| | N | | 1 | 2 | 3 | 5 | 5 | 5 | 5 | 6 | 5 | 5 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22 SEP66 N ATL RIDGE | 6367.79 | 100.78 | .027 | .604 | .297 | -.061 | 0 | .236 | .060 | -.499 | -.610 | -.218 |
| 25 JUL66 N ATLNTC RD | 6926.82 | 102.05 | .043 | 0 | .319 | -.204 | -.463 | .233 | 0 | -.549 | 0 | 0 |
| 17 DEC 65 MID ATL RG | 7946.80 | 101.43 | -.085 | .400 | .291 | -.395 | -.473 | .251 | .213 | -.688 | -.849 | -.155 |
| 17 DEC 65 MID ATL RG | 7553.26 | 101.05 | -.031 | .340 | .382 | -.380 | -.616 | .062 | .075 | -.789 | -.661 | -1.247 |
| 17 DEC65 MID ATL RDG | 7553.82 | 101.20 | -.018 | .397 | .244 | -.279 | -.556 | .152 | .202 | -.658 | -.817 | -.337 |
| 03 JUN 66 MID ATL RG | 7946.36 | 99.66 | -.114 | .199 | .210 | -.908 | 0 | .047 | 0 | -.788 | -.629 | 0 |
| | AVERAGE | | -.030 | .388 | .284 | -.305 | -.527 | .163 | .138 | -.662 | -.673 | -.240 |
| | SIGMA | | .061 | .146 | .061 | .158 | .072 | .091 | .081 | .120 | .083 | .076 |
| | N | | 6 | 5 | 6 | 6 | 4 | 6 | 4 | 6 | 5 | 4 |

E V E N T P A R A M E T E R S

| 6 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. GARDA | ND. STA |
|---|---|---|---|---|---|---|---|
| 22 SEP66 N ATL RIDGE | 16.600 | -46.700 | 33 | 06 09 00.0 | .1090 | .062 | 17 |
| 25 JUL66 N ATLNTC RD | 12.200 | -43.900 | 33 | 11 42 01.0 | .0751 | .065 | 12 |
| 17 DEC 65 MID ATL RG | 8.500 | -39.600 | 33 | 10 54 50.5 | .0946 | .010 | 17 |
| 17 DEC 65 MID ATL RG | 8.700 | -39.300 | 33 | 06 12 32.8 | .0735 | -.031 | 17 |
| 17 DEC65 MID ATL RDG | 8.800 | -39.400 | 33 | 06 17 24.7 | .0664 | -.026 | 16 |
| 03 JUN 66 MID ATL RG | 7.000 | -35.900 | 33 | 20 02 51.0 | .1117 | -.071 | 15 |

11 15 67

# RELATIVE TRAVEL-TIME ANOMALIES

HERRIN66 TRAVEL-TIME TABLES  REFERENCE STATION  AB

INCLUDING ELLIPTICITY

ANOMALY REGION = EQUATORIAL MID-ATLANTIC RIDGE
DISTANCE RANGE = 9043 TO 9338 KM  AZIMUTH RANGE = 96.3 TO 100.8 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | O1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14 NOV 65 MID ATL RG | 9043.10 | 97.63 | 0 | 0 | 0 | .201 | .059 | -.110 | -.312 | .131 | 0 | -.286 |
| 14 MAR66 MID ATL RDG | 9059.31 | 97.76 | -.054 | -.020 | .099 | .210 | .266 | -.060 | -.200 | .242 | .043 | -.256 |
| 01 JAN66 MID ATL RDG | 9258.24 | 98.27 | 0 | 0 | 0 | 0 | .190 | -.013 | -.175 | .204 | 0 | -.365 |
| 12 JUN66 S ATL OCEAN | 9337.52 | 100.79 | .018 | -.106 | .013 | .175 | .144 | -.053 | -.179 | .248 | .008 | -.290 |
| AVERAGE | | | -.018 | -.067 | .056 | .195 | .165 | -.061 | -.217 | .206 | .036 | -.299 |
| SIGMA | | | .051 | .055 | .061 | .010 | .087 | .043 | .065 | .054 | .839 | .046 |
| N | | | 2 | 2 | 2 | 3 | 4 | 4 | 4 | 4 | 2 | 4 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14 NOV 65 MID ATL RG | 9043.10 | 97.63 | 0 | 0 | .211 | -.239 | -.414 | 0 | 0 | 0 | 0 | 0 |
| 14 MAR66 MID ATL RDG | 9059.31 | 97.76 | 0 | .017 | .084 | -.245 | -.337 | -.022 | .008 | -.539 | -.641 | -.236 |
| 01 JAN66 MID ATL RDG | 9258.24 | 98.27 | 0 | -.000 | .132 | -.311 | -.399 | -.053 | .022 | -.526 | -.574 | -.315 |
| 12 JUN66 S ATL OCEAN | 9337.52 | 100.79 | -.167 | .127 | .234 | -.246 | -.410 | .026 | .006 | -.594 | -.587 | -.232 |
| AVERAGE | | | -.167 | .045 | .165 | -.260 | -.390 | -.016 | .039 | -.553 | -.601 | -.261 |
| SIGMA | | | 0 | .072 | .070 | .034 | .036 | .040 | .043 | .034 | .035 | .047 |
| N | | | 1 | 3 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 3 |

## EVENT PARAMETERS

| 4 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 14 NOV 65 MID ATL RG | 1.100 | -27.700 | 27 | 07 52 49.0 | .0638 | -.030 | 9 |
| 14 MAR66 MID ATL RDG | .900 | -27.700 | 33 | 03 21 31.7 | .0439 | .015 | 19 |
| 01 JAN66 MID ATL RDG | .600 | -25.400 | 33 | 19 25 50.9 | .0407 | -.011 | 14 |
| 12 JUN66 S ATL OCEAN | -3.000 | -20.200 | 18 | 20 20 50.1 | .0379 | .007 | 20 |

11 19 67 RELATIVE TRAVEL-TIME ANOMALIES

HERRIN68 TRAVEL-TIME TABLES REFERENCE STATION AG

INCLUDING ELLIPTICITY

ANOMALY REGION = CENTRAL MID-ATLANTIC RIDGE AND ASC. IS.
DISTANCE RANGE = 9790 TO 9871 KM AZIMUTH RANGE = 91.3 TO 93.2 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24 JAN 67 MID ATL RG | 9790.20 | 93.22 | -.097 | -.101 | -.064 | .092 | .204 | .014 | -.193 | .221 | .114 | -.207 |
| 15 NOV65 MID-ATL RDG | 9841.95 | 92.80 | 0 | 0 | 0 | .121 | .160 | -.030 | -.274 | .248 | .146 | -.229 |
| 05 MAR 66 N ASCEN IS | 9871.47 | 91.20 | .131 | -.231 | -.047 | .166 | .176 | 0 | -.331 | .169 | .117 | -.232 |
| AVERAGE | | | .037 | -.166 | -.056 | .126 | .183 | -.000 | -.266 | .210 | .124 | -.223 |
| SIGMA | | | .133 | .092 | .012 | .037 | .019 | .031 | .069 | .044 | .019 | .013 |
| N | | | 2 | 2 | 2 | 3 | 3 | 2 | 3 | 3 | 3 | 3 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24 JAN 67 MID ATL RG | 9790.20 | 93.22 | 0 | 0 | .175 | -.153 | -.300 | -.041 | 0 | 0 | -.590 | -.308 |
| 15 NOV65 MID-ATL RDG | 9841.95 | 92.00 | 0 | 0 | .172 | -.151 | -.394 | -.126 | .197 | 0 | -.643 | -.227 |
| 05 MAR 66 N ASCEN IS | 9871.47 | 91.29 | 0 | 0 | .179 | -.199 | -.405 | -.106 | .230 | -.540 | -.668 | 0 |
| AVERAGE | | | 0 | 0 | .175 | -.167 | -.366 | -.091 | .194 | -.540 | -.620 | -.260 |
| SIGMA | | | 0 | 0 | .003 | .027 | .057 | .044 | .051 | 0 | .062 | .057 |
| N | | | 0 | 0 | 3 | 3 | 3 | 3 | 2 | 1 | 3 | 2 |

EVENT PARAMETERS

| 3 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 24 JAN 67 MID ATL RG | -.800 | -19.900 | 33 | 15 21 50.4 | .0481 | .014 | 16 |
| 15 NOV65 MID-ATL RDG | -.300 | -10.700 | 24 | 11 18 49.9 | .0255 | -.005 | 14 |
| 05 MAR 66 N ASCEN IS | 0 | -14.800 | 33 | 20 54 45.7 | .0430 | -.010 | 16 |

11 15 67 RELATIVE TRAVEL-TIME ANOMALIES

HERRIN66TRAVEL-TIME TABLES REFERENCE STATION A0

INCLUDING ELLIPTICITY

ANOMALY REGION = DOMINICAN REP., MONA PASSAGE
DISTANCE RANGE = 4480 TO 4678 KM AZIMUTH RANGE = 117.7 TO 120.3 DEGREES

| | EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 06 | MAY 67 DOM REP | 4479.59 | 120.33 | .099 | -.064 | -.854 | 0 | .494 | .108 | -.118 | 0 | .365 | -.204 |
| 01 | APR 66 DOMIN REP | 4525.22 | 120.28 | .114 | .034 | -.693 | .218 | .365 | -.042 | -.142 | .214 | .444 | -.271 |
| 10 | SEP66 MONA PASSAG | 4619.98 | 117.99 | .084 | -.068 | -.039 | .252 | .340 | .068 | 0 | .317 | .337 | -.213 |
| 04 | NOV 66 MONA PASS | 4625.86 | 117.68 | .129 | .008 | -.092 | .285 | .427 | .039 | -.115 | .297 | .377 | -.178 |
| 14 | OCT 66 MONA PASS | 4628.44 | 118.09 | .173 | -.019 | .002 | .221 | .418 | .115 | -.138 | 0 | .442 | 0 |
| 31 | OCT 66 MONA PASS | 4633.51 | 117.77 | .077 | -.030 | -.081 | .214 | .365 | .018 | -.173 | .238 | .403 | -.288 |
| 03 | NOV 66 MONA PASS | 4636.92 | 118.18 | .071 | -.029 | -.097 | .141 | .336 | .084 | -.127 | .239 | .388 | -.214 |
| 17 | JUN66 MONA PASSAG | 4643.10 | 119.73 | .127 | -.025 | -.053 | .269 | .360 | -.023 | -.164 | .275 | .330 | -.221 |
| 07 | DEC 66 MONA PASS | 4665.80 | 119.60 | .078 | -.067 | -.083 | .221 | .384 | .029 | -.198 | .298 | .361 | 0 |
| 20 | NOV 66 MONA PASS | 4678.32 | 119.38 | .111 | .003 | .005 | .233 | .459 | .042 | -.131 | .307 | .390 | -.280 |
| | | AVERAGE | | .106 | -.028 | -.094 | .219 | .391 | .043 | -.144 | .280 | .390 | -.236 |
| | | SIGMA | | .032 | .034 | .036 | .036 | .045 | .051 | .029 | .037 | .040 | .043 |
| | | N | | 10 | 10 | 10 | 9 | 10 | 10 | 9 | 8 | 10 | 8 |

| | EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 06 | MAY 67 DOM REP | 4479.59 | 120.33 | -.008 | 0 | .726 | -.093 | -.291 | .236 | .935 | -.394 | -.412 | 0 |
| 01 | APR 66 DOMIN REP | 4525.22 | 120.28 | -.037 | .792 | 0 | -.197 | -.319 | .146 | .847 | -.378 | -.433 | .545 |
| 10 | SEP66 MONA PASSAG | 4619.98 | 117.99 | -.030 | .850 | .685 | 0 | -.267 | .338 | 0 | -.477 | -.459 | .414 |
| 04 | NOV 66 MONA PASS | 4625.86 | 117.68 | -.009 | .948 | .896 | -.182 | -.381 | .223 | 0 | -.492 | -.509 | 0 |
| 14 | OCT 66 MONA PASS | 4628.44 | 118.09 | .044 | 0 | .410 | -.173 | -.312 | .385 | .709 | -.530 | -.424 | .719 |
| 31 | OCT 66 MONA PASS | 4633.51 | 117.77 | -.039 | .827 | .851 | -.217 | -.405 | .268 | .742 | -.490 | -.568 | .377 |
| 03 | NOV 66 MONA PASS | 4636.92 | 118.16 | -.003 | .749 | .824 | -.129 | -.296 | .290 | .895 | -.549 | -.540 | .478 |
| 17 | JUN66 MONA PASSAG | 4643.10 | 119.73 | -.054 | .799 | 0 | -.119 | -.270 | .261 | 0 | -.470 | -.464 | .470 |
| 07 | DEC 66 MONA PASS | 4665.80 | 119.60 | -.045 | 0 | .738 | -.194 | 0 | .171 | .777 | -.581 | -.475 | .599 |
| 20 | NOV 66 MONA PASS | 4678.32 | 119.38 | -.033 | .842 | .902 | -.164 | -.349 | .272 | .910 | -.497 | -.479 | .434 |
| | | AVERAGE | | -.021 | .830 | .745 | -.153 | -.317 | .255 | .838 | -.478 | -.485 | .609 |
| | | SIGMA | | .028 | .063 | .154 | .039 | .053 | .070 | .070 | .054 | .063 | .084 |
| | | N | | 10 | 7 | 8 | 9 | 9 | 10 | 7 | 10 | 10 | 8 |

E V E N T P A R A M E T E R S

| | 10 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|---|
| 06 | MAY 67 DOM REP | 19.300 | -70.000 | 39 | 14 00 41.4 | .0327 | -.038 | 16 |
| 01 | APR 66 DOMIN REP | 19.800 | -69.700 | 33 | 01 37 21.0 | .0561 | -.011 | 19 |
| 10 | SEP66 MONA PASSAG | 19.300 | -67.900 | 28 | 21 58 46.8 | .0399 | .009 | 17 |
| 04 | NOV 66 MONA PASS | 19.400 | -67.700 | 33 | 10 52 57.6 | .0529 | .011 | 18 |
| 14 | OCT 66 MONA PASS | 19.200 | -67.900 | 43 | 01 49 28.0 | .1024 | .012 | 17 |
| 31 | OCT 66 MONA PASS | 19.300 | -67.700 | 33 | 05 11 59.8 | .0514 | -.026 | 20 |
| 03 | NOV 66 MONA PASS | 19.100 | -67.900 | 47 | 11 37 22.7 | .0458 | -.008 | 20 |
| 17 | JUN66 MONA PASSAG | 18.400 | -68.700 | 184 | 01 14 02.0 | .0333 | .001 | 18 |
| 07 | DEC 66 MONA PASS | 18.300 | -68.900 | 141 | 23 54 39.9 | .0364 | -.027 | 17 |
| 20 | NOV 66 MONA PASS | 18.300 | -68.300 | 186 | 07 29 37.9 | .0490 | .018 | 28 |

11 15 67

# RELATIVE TRAVEL-TIME ANOMALIES

HERRIN66 TRAVEL-TIME TABLES

REFERENCE STATION A0

INCLUDING ELLIPTICITY

ANOMALY REGION = VIRGIN IS., LEEWARD IS.,
DISTANCE RANGE = 4856 TO 5262 KM AZIMUTH RANGE = 112.0 TO 115.0 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 JAN66 VIRGIN IS. | 4856.16 | 114.80 | .040 | -.121 | -.027 | .208 | .286 | .018 | -.135 | .282 | .274 | -.211 |
| 16 JUL66 VIRGIN | 4938.12 | 115.54 | .135 | -.074 | .023 | .216 | .339 | .020 | -.126 | .293 | .327 | -.110 |
| 11 APR 67 LEEWARD IS | 5020.89 | 113.06 | -.053 | -.135 | -.045 | .080 | .156 | -.027 | -.145 | .145 | .175 | -.311 |
| 16 APR 66 LEEWARD IS | 5111.37 | 112.83 | -.043 | -.110 | -.094 | .124 | .191 | -.073 | -.160 | .211 | .154 | -.305 |
| 13 NOV 66 LEEWARD IS | 5234.99 | 112.97 | .110 | -.135 | -.038 | .207 | .298 | .042 | -.091 | .213 | .295 | 0 |
| 13 NOV 66 LEEWARD IS | 5243.26 | 113.06 | .079 | -.024 | -.018 | .146 | .216 | .049 | -.229 | .192 | .252 | -.213 |
| 24 APR66 LEEWARD IS | 5259.77 | 112.82 | .112 | -.109 | -.035 | 0 | .259 | .036 | -.196 | .313 | .284 | 0 |
| 15 JUL66 LEEWARD IS. | 5262.40 | 113.41 | .070 | -.204 | .048 | 0 | .274 | -.146 | -.242 | .286 | 0 | -.271 |
| | AVERAGE | | .056 | -.124 | -.023 | .164 | .250 | -.022 | -.166 | .242 | .252 | -.237 |
| | SIGMA | | .070 | .058 | .043 | .056 | .059 | .065 | .053 | .060 | .064 | .076 |
| | N | | 8 | 8 | 8 | 6 | 8 | 8 | 8 | 8 | 7 | 6 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F6 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 JAN66 VIRGIN IS. | 4856.16 | 114.80 | .033 | .662 | .368 | -.187 | -.177 | .373 | .286 | -.484 | 0 | -.376 |
| 16 JUL66 VIRGIN | 4938.12 | 115.54 | -.026 | .733 | .658 | -.065 | -.347 | .301 | 0 | -.508 | -.599 | .433 |
| 11 APR 67 LEEWARD IS | 5020.89 | 113.06 | .037 | .440 | .354 | -.353 | -.289 | .505 | .833 | -.563 | -.440 | .299 |
| 16 APR 66 LEEWARD IS | 5111.37 | 112.83 | -.053 | .596 | .374 | -.252 | -.412 | .366 | .235 | -.598 | -.582 | .233 |
| 13 NOV 66 LEEWARD IS | 5234.99 | 112.97 | .062 | .744 | .464 | -.325 | -.365 | .426 | .312 | 0 | -.595 | .270 |
| 13 NOV 66 LEEWARD IS | 5243.26 | 113.06 | .024 | 0 | .513 | -.246 | -.339 | .447 | .251 | -.578 | -.514 | .384 |
| 24 APR66 LEEWARD IS | 5259.77 | 112.82 | -.003 | .769 | .577 | -.118 | -.264 | .462 | .209 | -.696 | -.567 | .163 |
| 15 JUL66 LEEWARD IS. | 5262.40 | 113.41 | -.088 | .633 | .475 | -.211 | 0 | .341 | .211 | 0 | -.599 | .232 |
| | AVERAGE | | -.002 | .654 | .449 | -.220 | -.313 | .403 | .220 | -.568 | -.557 | .301 |
| | SIGMA | | .051 | .113 | .104 | .097 | .077 | .068 | .090 | .063 | .059 | .068 |
| | N | | 8 | 7 | 8 | 8 | 7 | 8 | 7 | 6 | 7 | 8 |

## EVENT PARAMETERS

| # EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 13 JAN66 VIRGIN IS. | 19.100 | -64.700 | 41 | 10 30 51.1 | .0544 | .028 | 19 |
| 16 JUL66 VIRGIN | 18.200 | -64.600 | 130 | 20 09 51.1 | .0938 | -.057 | 19 |
| 11 APR 67 LEEWARD IS | 16.800 | -62.700 | 49 | 12 42 47.7 | .0982 | -.046 | 20 |
| 16 APR 66 LEEWARD IS | 16.500 | -62.000 | 80 | 07 12 37.1 | .0508 | -.046 | 20 |
| 13 NOV 66 LEEWARD IS | 17.400 | -61.300 | 65 | 14 29 54.9 | .0582 | .018 | 18 |
| 13 NOV 66 LEEWARD IS | 17.300 | -61.300 | 52 | 11 42 25.9 | .0462 | .010 | 19 |
| 24 APR66 LEEWARD IS | 17.700 | -60.600 | 33 | 23 04 03.0 | .0663 | .008 | 18 |
| 15 JUL66 LEEWARD IS. | 16.900 | -61.500 | 89 | 00 00 00.7 | .0608 | -.026 | 16 |

11 15 67 R E L A T I V E T R A V E L - T I M E A N O M A L I E S

HERRIN66 TRAVEL-TIME TABLES REFERENCE STATION A8

INCLUDING ELLIPTICITY

ANOMALY REGION = SOUTHERN W. INDIES - VENEZUELA
DISTANCE RANGE = 5505 TO 5709 KM AZIMUTH RANGE = 115.9 TO 120.4 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | CA | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 FEB 66 WINDWRD IS | 5505.00 | 115.93 | .099 | -.206 | -.116 | .202 | .324 | 0 | -.294 | .160 | .178 | -.221 |
| 09 JAN66 WINDWARD IS | 5467.84 | 118.92 | .086 | -.220 | -.150 | .121 | .281 | -.010 | -.264 | .082 | .243 | 0 |
| 26 APR 67 WINDWRD IS | 5694.01 | 119.16 | .053 | -.110 | -.038 | .290 | .376 | .070 | -.250 | .233 | .365 | -.329 |
| 14 MAY66 VENEZUELA | 5708.90 | 120.40 | 0 | -.153 | -.060 | .188 | .299 | .004 | -.241 | .201 | .329 | -.287 |
| 08 OCT 66 CST VENEZ. | 5709.02 | 119.77 | .069 | -.137 | -.014 | .294 | .363 | .105 | -.201 | .253 | .466 | -.221 |
| | AVERAGE | | .076 | -.165 | -.076 | .219 | .329 | .044 | -.250 | .186 | .316 | -.265 |
| | SIGMA | | .021 | .047 | .056 | .073 | .041 | .056 | .034 | .068 | .111 | .053 |
| | N | | A | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 4 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | EA | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 FEB 66 WINDWRD IS | 5505.00 | 115.93 | 0 | .600 | .929 | 0 | 0 | .157 | .798 | -.075 | -.118 | .290 |
| 09 JAN66 WINDWARD IS | 5467.84 | 118.92 | -.166 | 0 | .696 | -.208 | -.485 | .226 | .876 | -.395 | 0 | .336 |
| 26 APR 67 WINDWRD IS | 5694.01 | 119.16 | 0 | .796 | .932 | -.083 | -.419 | .262 | 1.037 | -.502 | -.515 | .466 |
| 14 MAY66 VENEZUELA | 5708.90 | 120.40 | 0 | .742 | .762 | -.066 | 0 | .195 | .792 | 0 | -.013 | .319 |
| 08 OCT 66 CST VENEZ. | 5709.02 | 119.77 | -.043 | .702 | .944 | -.172 | -.388 | .194 | .913 | -.495 | -.443 | .373 |
| | AVERAGE | | -.104 | .725 | .852 | -.132 | -.473 | .207 | .383 | -.367 | -.272 | .397 |
| | SIGMA | | .087 | .058 | .116 | .068 | .042 | .039 | .100 | .200 | .244 | .068 |
| | N | | 2 | 4 | 5 | 4 | 3 | 5 | 5 | 4 | 4 | 5 |

E V E N T P A R A M E T E R S

| 5 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 13 FEB 66 WINDWRD IS | 14.100 | -61.400 | 192 | 06 07 24.1 | .1035 | .001 | 16 |
| 09 JAN66 WINDWARD IS | 11.500 | -62.300 | 156 | 09 11 30.3 | .0700 | -.053 | 17 |
| 26 APR 67 WINDWRD IS | 11.200 | -62.300 | 121 | 10 47 49.6 | .0819 | .021 | 19 |
| 14 MAY66 VENEZUELA | 10.500 | -63.000 | 16 | 20 27 27.4 | .0795 | .003 | 16 |
| 08 OCT 66 CST VENEZ. | 10.800 | -62.600 | 90 | 19 39 40.5 | .0759 | .021 | 20 |

11 15 67

# RELATIVE TRAVEL-TIME ANOMALIES

HERRIN66 TRAVEL-TIME TABLES — REFERENCE STATION A0

INCLUDING ELLIPTICITY

ANOMALY REGION = EASTERN MEXICO = 1
DISTANCE RANGE = 3434 TO 3799 KM AZIMUTH RANGE = 156.6 TO 158.6 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22 JAN66 CHIAPAS MEX | 3433.98 | 157.01 | -.178 | .055 | 0 | .108 | -.019 | .078 | -.009 | .292 | .149 | -.090 |
| 06 FEB66 MEXICO | 3408.12 | 158.93 | -.136 | -.009 | -.118 | .083 | -.021 | -.004 | -.136 | .136 | -.044 | -.160 |
| 19 FEB66 OAXACA MEX | 3443.78 | 158.21 | -.027 | -.132 | -.024 | -.011 | .160 | 0 | -.033 | .181 | .003 | -.122 |
| 12 JAN66 OAXACA MEX. | 3448.81 | 158.40 | -.133 | .016 | .030 | .059 | .110 | -.037 | .020 | .187 | .038 | -.127 |
| 07 MAR66 CHIAPAS MEX | 3768.72 | 158.96 | -.139 | -.062 | -.008 | .117 | .115 | -.019 | -.020 | .141 | 0 | -.121 |
| 09 FEB66 CHIAPAS MEX | 3795.96 | 158.73 | -.080 | -.003 | .030 | .069 | 0 | -.076 | -.015 | .190 | .079 | 0 |
| 16 AUG66 CHIAPAS | 3799.00 | 158.96 | 0 | .007 | 0 | .119 | 0 | 0 | -.006 | .138 | 0 | 0 |
| AVERAGE | | | -.115 | -.018 | -.018 | .086 | .070 | -.012 | -.029 | .101 | .049 | -.125 |
| SIGMA | | | .053 | .061 | .061 | .057 | .089 | .057 | .050 | .055 | .074 | .022 |
| N | | | 6 | 7 | 5 | 7 | 5 | 5 | 7 | 7 | 5 | 5 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22 JAN66 CHIAPAS MEX | 3433.98 | 157.01 | 0 | .631 | .674 | 0 | -.001 | .267 | 0 | .150 | -.220 | .693 |
| 06 FEB66 MEXICO | 3408.12 | 158.93 | .198 | .407 | .591 | -.138 | -.050 | .249 | .714 | -.030 | -.138 | .503 |
| 19 FEB66 OAXACA MEX | 3443.78 | 158.21 | .241 | 0 | .665 | -.002 | 0 | .129 | .818 | .037 | -.292 | .595 |
| 12 JAN66 OAXACA MEX. | 3448.81 | 158.40 | 0 | .490 | .571 | -.083 | -.219 | .255 | .837 | .021 | 0 | .611 |
| 07 MAR66 CHIAPAS MEX | 3768.72 | 158.96 | .296 | .561 | .571 | -.098 | -.011 | .385 | .634 | .086 | -.118 | .649 |
| 09 FEB66 CHIAPAS MEX | 3795.96 | 158.73 | .137 | .488 | .520 | -.140 | -.162 | .357 | .656 | -.041 | -.249 | .596 |
| 16 AUG66 CHIAPAS | 3799.00 | 158.96 | 0 | 0 | 0 | 0 | -.067 | .446 | 0 | -.013 | -.238 | .589 |
| AVERAGE | | | .218 | .515 | .599 | -.108 | -.098 | .298 | .732 | .019 | -.208 | .617 |
| SIGMA | | | .067 | .089 | .060 | .029 | .077 | .106 | .092 | .064 | .070 | .040 |
| N | | | 4 | 5 | 6 | 5 | 6 | 7 | 5 | 7 | 6 | 7 |

## EVENT PARAMETERS

| EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 22 JAN66 CHIAPAS MEX | 17.400 | -94.100 | 139 | 07 36 49.3 | .0817 | .046 | 16 |
| 06 FEB66 MEXICO | 19.900 | -93.600 | 92 | 04 12 24.9 | .0598 | -.034 | 20 |
| 19 FEB66 OAXACA MEX | 15.400 | -94.200 | 43 | 02 00 44.0 | .0754 | -.008 | 17 |
| 12 JAN66 OAXACA MEX. | 15.300 | -94.400 | 51 | 12 29 29.1 | .0478 | .000 | 10 |
| 07 MAR66 CHIAPAS MEX | 14.900 | -93.200 | 22 | 09 10 54.5 | .0536 | .015 | 19 |
| 09 FEB66 CHIAPAS MEX | 14.300 | -93.000 | 53 | 00 55 19.8 | .0502 | -.019 | 18 |
| 16 AUG66 CHIAPAS | 14.300 | -92.900 | 40 | 15 00 46.0 | .0668 | .014 | 9 |

11 15 67 R E L A T I V E T R A V E L - T I M E A N O M A L I E S

HERRIN66 TRAVEL-TIME TABLES REFERENCE STATION A0

INCLUDING ELLIPTICITY

ANOMALY REGION = EASTERN MEXICO - 2
DISTANCE RANGE = 3187 TO 3499 KM AZIMUTH RANGE = 162.6 TO 169.2 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25 SEP66 GUERRERO | 3187.03 | 169.21 | -.080 | -.023 | .088 | .051 | .007 | -.076 | -.030 | .155 | -.034 | -.194 |
| 21 DEC65 GUERRERO MX | 3397.63 | 164.56 | 0 | 0 | 0 | 0 | .066 | -.100 | 0 | .155 | .038 | -.178 |
| 02 APR66 OAXACA MEX | 3444.94 | 163.39 | -.043 | -.093 | .103 | .162 | -.083 | .073 | .820 | .138 | .084 | -.094 |
| 16 FEB 67 OAXACA | 3499.36 | 162.65 | 0 | -.023 | .165 | .046 | .103 | -.014 | .001 | .183 | .040 | -.111 |
| AVERAGE | | | -.060 | -.046 | .119 | .086 | .024 | -.029 | -.003 | .156 | .040 | -.144 |
| SIGMA | | | .032 | .041 | .041 | .066 | .081 | .077 | .025 | .021 | .053 | .050 |
| N | | | 2 | 3 | 3 | 3 | 4 | 4 | 3 | 4 | 4 | 4 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25 SEP66 GUERRERO | 3187.03 | 169.21 | .190 | .498 | .605 | -.104 | -.196 | .284 | 0 | -.088 | .041 | .551 |
| 21 DEC65 GUERRERO MX | 3397.63 | 164.56 | .156 | .482 | .522 | 0 | -.239 | .268 | .713 | .038 | -.061 | .476 |
| 02 APR66 OAXACA MEX | 3444.94 | 163.39 | .157 | .500 | .623 | -.127 | -.069 | .283 | .847 | .027 | -.041 | .713 |
| 16 FEB 67 OAXACA | 3490.36 | 162.65 | .190 | .465 | .563 | -.127 | -.231 | .300 | .781 | .160 | -.016 | .479 |
| AVERAGE | | | .173 | .486 | .578 | -.120 | -.184 | .284 | .781 | .034 | -.019 | .430 |
| SIGMA | | | .010 | .017 | .045 | .013 | .079 | .013 | .067 | .101 | .044 | .078 |
| N | | | 4 | 4 | 4 | 3 | 4 | 4 | 3 | 4 | 4 | 4 |

E V E N T P A R A M E T E R S

| 4 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 25 SEP66 GUERRERO | 16.300 | -100.800 | 60 | 06 02 26.4 | .0476 | -.019 | 19 |
| 21 DEC65 GUERRERO MX | 16.800 | -98.100 | 53 | 08 41 00.4 | .0429 | -.027 | 14 |
| 02 APR66 OAXACA MEX | 16.500 | -97.400 | 42 | 01 32 38.3 | .0580 | .020 | 20 |
| 16 FEB 67 OAXACA | 16.100 | -96.900 | 60 | 19 52 11.6 | .0444 | .018 | 19 |

11 15 67 R E L A T I V E T R A V E L - T I M E A N O M A L I E S

HERRIN66 TRAVEL-TIME TABLES REFERENCE STATION A0

INCLUDING ELLIPTICITY

ANOMALY REGION = NORTHERN CENTRAL AMERICA
DISTANCE RANGE = 3869 TO 4362 KM AZIMUTH RANGE = 147.9 TO 154.7 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 17 JAN66 GUATEMALA | 3868.58 | 154.75 | 0 | -.083 | .039 | -.019 | 0 | 0 | -.231 | .104 | .052 | 0 |
| 13 MAR66 HONDURAS | 3945.46 | 140.27 | -.107 | -.074 | -.020 | .001 | .170 | .023 | -.289 | .176 | .107 | 0 |
| 04 APR66 EL SALVADOR | 3958.55 | 151.47 | 0 | -.070 | .026 | .124 | .168 | -.112 | -.126 | .134 | 0 | -.101 |
| 07 AUG66 EL SALVADOR | 3986.18 | 151.99 | .009 | -.101 | .009 | .133 | .191 | .042 | -.033 | .198 | .246 | 0 |
| 01 JUL66 EL SALVADOR | 4017.64 | 140.70 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .211 | -.020 |
| 24 APR66 CST CENT AM | 4071.13 | 150.88 | -.052 | -.032 | .008 | .071 | .148 | -.002 | -.129 | .221 | .133 | 0 |
| 16 DEC65 EL SALVA.-A | 4074.86 | 150.73 | 0 | 0 | 0 | 0 | .099 | -.008 | 0 | .218 | .089 | 0 |
| 13 JUL66 NICARAGUA | 4158.32 | 140.29 | -.006 | .006 | .001 | .111 | .094 | .040 | .039 | .200 | .150 | .028 |
| 24 JUL66 CENT AMERCA | 4165.35 | 150.88 | 0 | 0 | 0 | 0 | .132 | 0 | 0 | .185 | .114 | 0 |
| 04 MAY66 NICARAGUA | 4172.54 | 140.20 | -.024 | .016 | .010 | 0 | .166 | 0 | 0 | .240 | .152 | 0 |
| 16 APR66 CST CENT AM | 4256.71 | 150.52 | -.055 | -.039 | -.015 | .000 | .135 | -.005 | -.122 | .226 | .150 | .001 |
| 12 OCT66 CST NICARAG | 4362.09 | 147.91 | -.033 | -.040 | -.002 | .076 | .162 | -.007 | -.137 | .178 | .136 | 0 |
| | AVERAGE | | -.038 | -.046 | .015 | .072 | .147 | -.004 | -.129 | .185 | .143 | -.033 |
| | SIGMA | | .038 | .040 | .031 | .055 | .032 | .049 | .102 | .042 | .054 | .056 |
| | N | | 7 | 9 | 9 | 8 | 10 | 8 | 8 | 11 | 11 | 4 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 17 JAN66 GUATEMALA | 3868.58 | 154.75 | .068 | .429 | .576 | -.056 | -.102 | .157 | .655 | -.009 | -.338 | .495 |
| 13 MAR66 HONDURAS | 3945.46 | 140.27 | 0 | .446 | .428 | .023 | -.110 | .193 | .575 | .089 | -.403 | .270 |
| 04 APR66 EL SALVADOR | 3958.55 | 151.47 | .024 | .528 | 0 | .109 | -.156 | .170 | .739 | .097 | -.340 | .444 |
| 07 AUG66 EL SALVADOR | 3986.18 | 151.99 | .269 | 0 | .710 | .118 | -.100 | .288 | .734 | .084 | -.336 | .597 |
| 01 JUL66 EL SALVADOR | 4017.64 | 140.70 | .166 | .629 | .443 | .060 | -.000 | .306 | .699 | .151 | 0 | .488 |
| 24 APR66 CST CENT AM | 4071.13 | 150.88 | .187 | .543 | .521 | .002 | -.064 | .260 | .605 | .106 | -.304 | .494 |
| 16 DEC65 EL SALVA.-A | 4074.86 | 150.73 | .182 | .511 | .494 | -.063 | -.127 | .248 | .643 | .108 | 0 | .383 |
| 13 JUL66 NICARAGUA | 4158.32 | 140.29 | .233 | .585 | .568 | .161 | -.047 | .359 | .743 | .191 | -.176 | .457 |
| 24 JUL66 CENT AMERCA | 4165.35 | 150.88 | .165 | 0 | .478 | 0 | -.143 | .183 | 0 | .046 | -.297 | .454 |
| 04 MAY66 NICARAGUA | 4172.54 | 140.20 | 0 | .538 | .626 | .173 | 0 | 0 | .778 | .204 | 0 | .503 |
| 16 APR66 CST CENT AM | 4256.71 | 150.52 | .172 | .533 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 OCT66 CST NICARAG | 4362.09 | 147.91 | .184 | .595 | .569 | .004 | -.106 | .252 | .679 | .076 | -.386 | .510 |
| | AVERAGE | | .165 | .530 | .541 | .053 | -.095 | .241 | .678 | .104 | -.315 | .460 |
| | SIGMA | | .071 | .059 | .087 | .085 | .047 | .066 | .068 | .061 | .064 | .088 |
| | N | | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 11 | 8 | 11 |

E V E N T P A R A M E T E R S

| 12 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 17 JAN66 GUATEMALA | 14.000 | -91.700 | 126 | 14 42 22.9 | .0776 | -.054 | 16 |
| 13 MAR66 HONDURAS | 14.400 | -88.400 | 27 | 21 46 22.0 | .0833 | -.058 | 18 |
| 04 APR66 EL SALVADOR | 13.800 | -89.700 | 188 | 19 50 07.6 | .0616 | -.022 | 17 |
| 07 AUG66 EL SALVADOR | 13.500 | -89.800 | 71 | 05 33 40.2 | .0772 | .047 | 18 |
| 01 JUL66 EL SALVADOR | 14.700 | -88.400 | 281 | 20 17 49.3 | .0656 | .024 | 11 |
| 24 APR66 CST CENT AM | 13.000 | -88.900 | 62 | 06 03 52.2 | .0273 | .000 | 19 |
| 16 DEC65 EL SALVA.-A | 13.000 | -88.800 | 33 | 05 22 54.0 | .0551 | -.031 | 13 |
| 13 JUL66 NICARAGUA | 12.600 | -87.700 | 61 | 08 20 59.4 | .0771 | .057 | 20 |
| 24 JUL66 CENT AMERCA | 12.200 | -88.600 | 33 | 18 50 55.0 | .0401 | -.026 | 10 |
| 04 MAY66 NICARAGUA | 12.500 | -87.600 | 60 | 18 13 54.3 | .0681 | .051 | 18 |
| 16 APR66 CST CENT AM | 11.500 | -88.100 | 33 | 13 21 33.0 | .0185 | .004 | 12 |
| 12 OCT66 CST NICARAG | 11.200 | -86.200 | 43 | 20 20 06.8 | .0218 | .002 | 19 |

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# RELATIVE TRAVEL-TIME ANOMALIES

HERRIN66TRAVEL-TIME TABLES — REFERENCE STATION A0

INCLUDING ELLIPTICITY

ANOMALY REGION = SOUTHERN CENTRAL AMERICA
DISTANCE RANGE = 4600 TO 9194 KM AZIMUTH RANGE = 144.4 TO 146.3 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 JUL66 COSTA RICA | 4600.13 | 145.18 | -.069 | -.048 | -.038 | .069 | .049 | -.037 | -.013 | .107 | .015 | -.068 |
| 09 APR66 COSTA RICA | 4629.32 | 144.16 | -.004 | .050 | .042 | .116 | .211 | -.034 | .020 | .237 | .144 | .065 |
| 25 JAN66 PANA-COST R | 4751.07 | 144.62 | .000 | -.029 | .098 | .140 | .230 | .111 | .005 | 0 | .166 | -.013 |
| 09 MAY66 COSTA RICA | 4782.79 | 145.12 | -.038 | -.065 | -.087 | .078 | .070 | -.047 | -.190 | .138 | .117 | -.029 |
| 5 AUG 66 PANAMA | 9033.72 | 145.88 | 0 | -.067 | -.038 | .066 | .080 | 0 | -.055 | .160 | .047 | -.034 |
| 01 APR66 SO PANAMA | 9139.89 | 144.29 | -.089 | -.082 | .027 | .120 | .088 | -.067 | -.136 | .170 | .052 | -.142 |
| 15 APR66 SO PANAMA | 9194.34 | 144.22 | -.064 | .018 | .026 | .120 | .181 | .041 | .012 | .186 | .125 | -.064 |
| AVERAGE | | | -.043 | -.031 | .004 | .100 | .130 | -.005 | -.045 | .166 | .094 | -.040 |
| SIGMA | | | .035 | .049 | .062 | .029 | .075 | .068 | .071 | .044 | .057 | .063 |
| N | | | 6 | 7 | 7 | 7 | 7 | 6 | 7 | 6 | 7 | 7 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 JUL66 COSTA RICA | 4600.13 | 145.18 | .193 | .452 | .455 | -.291 | 0 | .359 | .901 | .070 | 0 | 0 |
| 09 APR66 COSTA RICA | 4629.32 | 144.16 | .205 | .550 | .552 | -.056 | 0 | .344 | .801 | .163 | -.170 | .437 |
| 25 JAN66 PANA-COST R | 4751.07 | 144.62 | .234 | .646 | .681 | -.022 | -.020 | .339 | .830 | .179 | -.086 | .536 |
| 09 MAY66 COSTA RICA | 4782.79 | 145.12 | .160 | .433 | .487 | -.202 | -.125 | .265 | .694 | -.007 | -.143 | .391 |
| 5 AUG 66 PANAMA | 9033.72 | 145.88 | .203 | .611 | .642 | 0 | 0 | .486 | .494 | .187 | -.050 | 0 |
| 01 APR66 SO PANAMA | 9139.89 | 144.29 | .124 | .488 | .566 | -.135 | -.086 | .220 | .766 | 0 | -.116 | .486 |
| 15 APR66 SO PANAMA | 9194.34 | 144.22 | .182 | .591 | .593 | -.124 | -.023 | .349 | .828 | .153 | -.057 | .463 |
| AVERAGE | | | .180 | .529 | .568 | -.135 | -.063 | .337 | .709 | .123 | -.104 | .455 |
| SIGMA | | | .037 | .083 | .080 | .088 | .051 | .093 | .131 | .076 | .048 | .089 |
| N | | | 7 | 7 | 7 | 6 | 4 | 7 | 7 | 6 | 6 | 5 |

## EVENT PARAMETERS

| 7 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 10 JUL66 COSTA RICA | 9.900 | -83.700 | 33 | 19 16 59.0 | .0692 | -.051 | 17 |
| 09 APR66 COSTA RICA | 9.400 | -84.200 | 40 | 02 34 23.0 | .0589 | .036 | 19 |
| 25 JAN66 PANA-COST R | 8.800 | -82.800 | 71 | 16 59 53.0 | .0790 | .066 | 19 |
| 09 MAY66 COSTA RICA | 8.400 | -83.000 | 87 | 05 30 06.0 | .0688 | -.053 | 20 |
| 5 AUG 66 PANAMA | 6.100 | -82.600 | 33 | 20 09 07.8 | .0833 | .001 | 15 |
| 01 APR66 SO PANAMA | 5.100 | -82.500 | 39 | 15 19 51.6 | .0594 | -.030 | 19 |
| 15 APR66 SO PANAMA | 5.000 | -82.400 | 33 | 04 42 59.7 | .0417 | .027 | 20 |

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# RELATIVE TRAVEL-TIME ANOMALIES

HERRIN68TRAVEL-TIME TABLES — REFERENCE STATION A0

INCLUDING ELLIPTICITY

ANOMALY REGION = NORTHERN COLOMBIA

DISTANCE RANGE = 5148 TO 5721 KM  AZIMUTH RANGE = 132.7 TO 140.2 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 MAY66 NO COLOMBIA | 5148.23 | 137.98 | 0 | 0 | .078 | .172 | .292 | .099 | -.004 | .310 | .184 | .102 |
| 29 MAR66 NO COLUMBIA | 5361.99 | 134.33 | .071 | .079 | 0 | .219 | .351 | .029 | -.025 | 0 | .256 | -.165 |
| 09 JAN 67 W CST COL. | 5364.31 | 140.23 | .035 | -.052 | .062 | .180 | 0 | .043 | -.032 | .030 | .275 | 0 |
| 08 NOV 65 N COLUMBIA | 5404.59 | 133.71 | 0 | 0 | 0 | 0 | .374 | 0 | -.134 | .690 | .428 | 0 |
| 06 NOV 65 N COLUMBIA | 5414.15 | 133.77 | 0 | 0 | 0 | .203 | .393 | .245 | -.003 | .300 | .446 | -.220 |
| 10 JAN66 N COLUMBIA | 5415.06 | 132.71 | -.076 | -.073 | .045 | 0 | .334 | .029 | -.085 | .273 | .275 | 0 |
| 09 FEB 66 N COLUMBIA | 5419.69 | 133.66 | .060 | -.003 | .005 | .155 | .356 | .125 | -.115 | .201 | .309 | 0 |
| 09 MAR66 N. COLUMBIA | 5419.69 | 133.66 | .080 | -.013 | .045 | .255 | .366 | .105 | -.045 | .331 | .359 | -.092 |
| 21 APR66 NO COLUMBIA | 5423.72 | 133.84 | .037 | -.133 | -.124 | .114 | .243 | -.128 | -.143 | .162 | .133 | 0 |
| 24 JUN66 N. COLOMBIA | 5423.72 | 133.84 | .087 | -.073 | -.004 | .184 | .262 | .043 | -.103 | .322 | .293 | -.212 |
| 07 AUG 66 N COLUMBIA | 5423.72 | 133.84 | .007 | -.123 | -.034 | .194 | .282 | -.087 | -.183 | .232 | .253 | -.272 |
| 10 APR66 NO.COLUMBIA | 5429.24 | 133.72 | -.001 | -.104 | -.055 | .075 | .365 | .023 | -.065 | .252 | .256 | -.104 |
| 30 NOV65 N.COLOMBIA | 5429.24 | 133.72 | .069 | -.084 | .006 | .215 | .345 | .003 | -.085 | .342 | .348 | -.238 |
| 21 DEC65 N COLUMBIA | 5429.24 | 133.72 | 0 | 0 | 0 | .155 | .316 | -.056 | -.155 | .233 | .206 | -.226 |
| 20 FEB66 N COLUMBIA | 5429.24 | 133.72 | .019 | -.114 | -.055 | .203 | .345 | 0 | -.105 | .282 | .286 | -.214 |
| 07 JUL66 N. COLOMBIA | 5429.24 | 133.72 | -.061 | 0 | 0 | .175 | .265 | .043 | -.155 | .312 | .327 | -.154 |
| 06 JAN66 N COLUMBIA | 5433.29 | 133.90 | .036 | -.074 | -.053 | .134 | 0 | -.020 | -.053 | .234 | .279 | -.176 |
| 11 OCT66 COLUMBIA | 5463.83 | 138.46 | -.080 | -.019 | .038 | .127 | .270 | .006 | -.086 | .239 | .287 | 0 |
| 12 JUN66 N. COLOMBIA | 5467.52 | 138.99 | .085 | .005 | .088 | .205 | .471 | .058 | -.093 | .395 | .396 | -.138 |
| 03 JAN66 COLUMBIA | 5483.47 | 138.58 | 0 | 0 | 0 | 0 | 0 | .003 | -.086 | .281 | .222 | -.118 |
| 16 OCT66 COLUMBIA | 5683.59 | 137.17 | -.043 | -.028 | .029 | .212 | .284 | .039 | -.080 | .283 | .299 | 0 |
| 27 FEB 67 COLOMBIA | 5721.18 | 138.26 | .041 | .001 | .019 | .158 | .295 | .072 | -.049 | .243 | .229 | -.185 |
| | AVERAGE | | .023 | -.051 | .007 | .176 | .327 | .034 | -.083 | .283 | .285 | -.170 |
| | SIGMA | | .055 | .057 | .059 | .043 | .056 | .079 | .054 | .119 | .072 | .057 |
| | N | | 17 | 16 | 16 | 19 | 19 | 20 | 22 | 21 | 22 | 15 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 MAY66 NO COLOMBIA | 5148.23 | 137.98 | .317 | .657 | .028 | -.180 | .102 | .528 | .785 | .055 | 0 | .804 |
| 29 MAR66 NO COLUMBIA | 5361.99 | 134.33 | .162 | .721 | .092 | -.213 | .315 | .540 | .727 | -.112 | 0 | .864 |
| 09 JAN 67 W CST COL. | 5364.31 | 140.23 | 0 | .742 | .832 | -.112 | .365 | .629 | .750 | 0 | .086 | .685 |
| 08 NOV 65 N COLUMBIA | 5404.59 | 133.71 | .284 | .861 | 1.074 | -.203 | .216 | 0 | .880 | -.076 | .010 | .985 |
| 06 NOV 65 N COLUMBIA | 5414.15 | 133.77 | .296 | .861 | 1.111 | -.107 | .259 | .503 | .921 | -.007 | .049 | 1.017 |
| 10 JAN66 N COLUMBIA | 5415.06 | 132.71 | .209 | .581 | .875 | -.254 | .142 | .436 | 0 | -.117 | -.052 | .725 |
| 09 FEB 66 N COLUMBIA | 5419.69 | 133.66 | .126 | .756 | .910 | -.229 | .189 | .414 | .698 | -.190 | -.116 | .749 |
| 09 MAR66 N. COLUMBIA | 5419.69 | 133.66 | 0 | .825 | .959 | -.207 | .150 | .442 | .866 | -.047 | .014 | .796 |
| 21 APR66 NO COLUMBIA | 5423.72 | 133.84 | .048 | .674 | .851 | -.338 | -.001 | .351 | .772 | -.188 | -.094 | .457 |
| 24 JUN66 N. COLOMBIA | 5423.72 | 133.84 | .148 | .753 | .960 | -.205 | .220 | .419 | 0 | -.153 | 0 | .683 |
| 07 AUG 66 N COLUMBIA | 5423.72 | 133.84 | .068 | .663 | .940 | -.215 | .070 | .339 | .762 | -.173 | .026 | .683 |
| 10 APR66 NO.COLUMBIA | 5429.24 | 133.72 | .065 | .707 | .879 | -.256 | .090 | .389 | .757 | -.226 | -.108 | .554 |
| 30 NOV65 N.COLOMBIA | 5429.24 | 133.72 | .145 | .727 | .929 | -.257 | .160 | .420 | .687 | -.147 | .022 | .725 |
| 21 DEC65 N COLUMBIA | 5429.24 | 133.72 | .099 | .719 | .781 | -.290 | -.012 | .442 | .807 | -.183 | -.059 | .450 |
| 20 FEB66 N COLUMBIA | 5429.24 | 133.72 | .145 | 0 | .873 | -.255 | .201 | .408 | .887 | -.174 | -.028 | .702 |
| 07 JUL66 N. COLOMBIA | 5429.24 | 133.72 | .165 | .736 | .998 | -.244 | .261 | .478 | .847 | -.102 | -.038 | .780 |
| 06 JAN66 N COLUMBIA | 5433.29 | 133.90 | .051 | .686 | .871 | -.268 | .140 | .405 | .843 | -.159 | -.036 | 0 |
| 11 OCT66 COLUMBIA | 5463.83 | 138.46 | .226 | 0 | .032 | 0 | 0 | .540 | 0 | 0 | 0 | 0 |
| 12 JUN66 N. COLOMBIA | 5467.52 | 138.99 | .154 | .808 | 1.039 | -.196 | .310 | .526 | .893 | -.126 | .044 | .853 |
| 03 JAN66 COLUMBIA | 5483.47 | 138.58 | .160 | 0 | .869 | 0 | .135 | .450 | .816 | 0 | -.051 | 0 |
| 16 OCT66 COLUMBIA | 5683.59 | 137.17 | .220 | 0 | .993 | -.146 | .181 | .513 | 0 | -.210 | -.023 | .682 |
| 27 FEB 67 COLOMBIA | 5721.18 | 138.26 | .203 | .758 | .945 | -.170 | .200 | .489 | .849 | .231 | .036 | .643 |
| | AVERAGE | | .187 | .739 | .925 | -.219 | .180 | .459 | .830 | -.111 | -.018 | .738 |
| | SIGMA | | .079 | .074 | .085 | .059 | .099 | .070 | .060 | .109 | .057 | .131 |
| | N | | 30 | 18 | 22 | 20 | 21 | 21 | 18 | 19 | 18 | 19 |

## EVENT PARAMETERS

| 22 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 30 MAY66 NO COLOMBIA | 7.600 | -77.000 | 33 | 05 09 34.4 | .0856 | .021 | 17 |
| 29 MAR66 NO COLUMBIA | 7.200 | -73.700 | 185 | 10 06 14.0 | .0713 | .033 | 17 |
| 09 JAN 67 W CST COL. | 5.100 | -77.300 | 40 | 10 08 23.9 | .1115 | .018 | 16 |
| 08 NOV 65 N COLUMBIA | 7.100 | -73.100 | 142 | 14 24 10.6 | .1617 | .108 | 13 |
| 06 NOV 65 N COLUMBIA | 7.000 | -73.100 | 136 | 05 18 23.5 | .1336 | .105 | 17 |
| 10 JAN66 N COLUMBIA | 7.400 | -72.400 | 67 | 11 13 07.5 | .0514 | -.024 | 17 |
| 09 FEB 66 N COLUMBIA | 7.000 | -73.000 | 152 | 01 15 23.0 | .0509 | -.005 | 19 |
| 09 MAR66 N. COLUMBIA | 7.000 | -73.000 | 144 | 10 24 44.0 | .0542 | .046 | 19 |
| 21 APR66 NO COLUMBIA | 6.900 | -73.100 | 152 | 08 18 23.9 | .1072 | -.095 | 19 |
| 24 JUN66 N. COLOMBIA | 6.900 | -73.100 | 142 | 20 00 07.0 | .0367 | -.005 | 18 |
| 07 AUG 66 N COLUMBIA | 6.900 | -73.100 | 142 | 08 20 58.2 | .0740 | -.054 | 20 |
| 10 APR66 NO.COLUMBIA | 6.900 | -73.000 | 155 | 10 33 35.0 | .0790 | -.053 | 20 |
| 30 NOV65 N.COLOMBIA | 6.900 | -73.000 | 159 | 09 18 11.6 | .0383 | .001 | 20 |
| 21 DEC65 N COLUMBIA | 6.900 | -73.000 | 172 | 12 25 43.0 | .1012 | -.075 | 17 |
| 20 FEB66 N COLUMBIA | 6.900 | -73.000 | 152 | 04 10 27.5 | .0399 | -.019 | 18 |
| 07 JUL66 N. COLOMBIA | 6.900 | -73.000 | 147 | 00 10 30.5 | .0452 | .005 | 18 |
| 06 JAN66 N COLUMBIA | 6.800 | -73.100 | 168 | 04 15 59.3 | .0486 | -.034 | 18 |
| 11 OCT66 COLUMBIA | 4.900 | -76.000 | 101 | 08 57 45.0 | .0599 | -.014 | 12 |
| 12 JUN66 N. COLOMBIA | 6.500 | -73.000 | 142 | 03 56 20.0 | .0770 | .061 | 20 |
| 03 JAN66 COLUMBIA | 4.700 | -76.000 | 103 | 18 18 05.9 | .0384 | -.019 | 11 |
| 16 OCT66 COLUMBIA | 3.600 | -74.200 | 47 | 18 43 34.9 | .0497 | .004 | 17 |
| 27 FEB 67 COLOMBIA | 2.900 | -74.800 | 69 | 02 08 42.5 | .0882 | .026 | 20 |

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# R2LATIV2 TRAV2L-TIM2 ANOMALI2

HERRIN66 TRAV2L-TIM2 TABL2 2 — INCLUDING 2LLIPTICITY — R2FERENCE 2TATION A2

ANOMALY R2GION = PERU - 2CUADOR

DI2TANC2 RANG2 = 6025 TO 6497 KM  AZIMUTH RANGE = 143.2 TO 146.7 D2GR22

| | 2VENT NAM2 | DI2TANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24 | AUG66 2CUADOR | 6024.56 | 143.60 | .022 | -.025 | .023 | .226 | .271 | .035 | .003 | .315 | .185 | -.161 |
| 26 | MAR62 P2RU-2CU | 2129.07 | 146.66 | -.015 | -.027 | .062 | .140 | 0 | .026 | -.096 | 0 | .052 | -.021 |
| 12 | JAN66 PERU-ECUAD | 6132.45 | 143.53 | .026 | -.069 | .141 | .184 | .221 | -.126 | 0 | .239 | .140 | 0 |
| 29 | DEC69 PERU-EC. | 6209.77 | 144.30 | 0 | 0 | 0 | 0 | .276 | .013 | .034 | .253 | .172 | -.213 |
| 20 | AUG62 P2RU-2C BOR | 2214.24 | 144.19 | .007 | -.041 | .037 | .203 | .201 | -.069 | -.090 | .296 | .179 | -.193 |
| 13 | FEB 67 N PERU | 6497.43 | 143.21 | .040 | -.021 | 0 | .209 | .282 | .036 | -.043 | .335 | .237 | -.136 |
| | | AVERAGE | | .026 | -.036 | .082 | .194 | .290 | -.014 | -.023 | .296 | .165 | -.157 |
| | | SIGMA | | .031 | .020 | .044 | .030 | .033 | .069 | .040 | .036 | .048 | .091 |
| | | N | | 8 | 9 | 4 | 9 | 9 | 6 | 9 | 9 | 6 | 9 |

| | 2V2NT NAME | DI2TANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24 | AUG26 ECUADOR | 6024.56 | 143.20 | .254 | .723 | .652 | -.176 | .126 | .566 | .209 | .207 | .046 | .616 |
| 26 | MAR66 PERU-2CU | 6129.07 | 143.66 | .222 | .631 | 0 | -.126 | .012 | .440 | .618 | .034 | -.011 | .569 |
| 12 | JAN66 P2RU-ECUAD | 6132.45 | 143.53 | .126 | .731 | .661 | -.154 | -.142 | .456 | .699 | .116 | 0 | .543 |
| 29 | DEC69 P2RU-2C. | 6209.77 | 144.30 | .236 | .972 | .741 | -.293 | .021 | .929 | .769 | .294 | .034 | .455 |
| 20 | AUG62 P2RU-EC BOR | 6214.24 | 144.19 | .124 | .673 | .619 | -.117 | .040 | .463 | .734 | .046 | -.025 | .514 |
| 13 | FEB 67 N PERU | 6497.43 | 143.21 | .276 | .763 | .673 | -.237 | .003 | 0 | .896 | .146 | -.046 | .934 |
| | | AVERAGE | | .233 | .922 | .636 | -.196 | .010 | .502 | .207 | .100 | -.014 | .945 |
| | | SIGMA | | .036 | .071 | .061 | .048 | .087 | .094 | .090 | .068 | .037 | .044 |
| | | N | | 2 | 6 | 5 | 6 | 2 | 5 | 6 | 6 | 5 | 6 |

## E V 2 N T  P A R A M 2 T 2 R 2

| | E2ENT | EPICENTER | LATITUD2 | LONGITUD2 | DE2TH | ORIGIN TIM2 | SHOCK 2IGMA | AV. 2RROR | NO. 6TA |
|---|---|---|---|---|---|---|---|---|---|
| 24 | AUG66 2CUADOR | | -1.500 | -77.600 | 194 | 20 10 06.0 | .0515 | .036 | 20 |
| 26 | MAR66 P2RU-ECU | | -3.520 | -20.900 | 69 | 15 22 12.4 | .0446 | -.011 | 17 |
| 12 | JAN66 PERU-ECUAD | | -2.300 | -77.000 | 162 | 06 02 09.6 | .0563 | -.012 | 17 |
| 29 | DEC69 P2RU-2C. | | -3.200 | -77.300 | 24 | 04 02 24.1 | .0514 | -.021 | 16 |
| 20 | AUG66 PERU-EC BOR | | -3.208 | -77.200 | 116 | 07 43 27.6 | .0392 | -.015 | 20 |
| 13 | FEB 27 N PERU | | -9.200 | -79.400 | 89 | 10 25 43.9 | .0402 | .021 | 16 |

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# RELATIVE TRAVEL-TIME ANOMALIES

HERRIN66 TRAVEL-TIME TABLES INCLUDING ELLIPTICITY REFERENCE STATION A0

ANOMALY REGION = PERU - BRAZIL
DISTANCE RANGE = 6736 TO 7174 KM AZIMUTH RANGE = 140.5 TO 145.0 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 23 MAR66 PERU-BRAZIL | 6736.09 | 143.58 | -.116 | 0 | 0 | .160 | 0 | -.115 | -.184 | .176 | .212 | 0 |
| 07 NOV66 N PERU | 6737.40 | 144.95 | -.103 | 0 | .049 | .145 | .E58 | -.113 | -.150 | .325 | .148 | 0 |
| 21 MAY66 PERU-BRAZIL | 6834.78 | 143.54 | 0 | -.077 | .068 | .205 | .266 | -.021 | -.069 | .33E | .233 | -.186 |
| 09 SEP66 PERU-BRAZIL | 6853.95 | 143.38 | .037 | -.0E8 | .137 | .206 | .E20 | -.100 | -.101 | .322 | .138 | -.218 |
| 31 MAY66 PERU-BRAZIL | 6869.50 | 143.58 | 0 | -.039 | .128 | .266 | .297 | -.013 | -.090 | .294 | .171 | -.170 |
| 13 JAN66 PERU-BRAZIL | 6883.19 | 143E7 | .068 | .050 | .046 | .269 | .254 | 0 | 0 | 0 | .251 | -.275 |
| 13 OCT66 PERU BRAZIL | 6909.76 | 143.76 | -.108 | -.018 | .100 | .157 | .296 | -.108 | -.130 | .317 | .085 | -.206 |
| 27 MAR 67 BRAZIL | 7060.27 | 140179 | .018 | -.0E9 | .061 | .220 | .397 | .028 | -.081 | .3-8 | .E9E | -.192 |
| 15 FEB 67 PERU-BRAZL | 7070.19 | 140.84 | -.013 | -.100 | -.018 | .150 | .264 | -.023 | -.111 | .278 | .E51 | -.343 |
| 05 JUN 66 PERU-BRAZL | 7173.52 | 140.50 | 0 | -.204 | -.050 | 0 | 0 | -.166 | -.139 | .183 | .170 | 0 |
| | AVERAGE | | -.031 | -.091 | .058 | .167 | .E82 | -.070 | -.117 | .279 | .171 | -.227 |
| | SIGMA | | .077 | .079 | .06E | .048 | .053 | .064 | .037 | .078 | .068 | .061 |
| | N | | 7 | E | E | 9 | 8 | 9 | 9 | 9 | 10 | 7 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 23 MAR66 PERU-BRAZIL | 6736.09 | 143.58 | .076 | .598 | .823 | -.153 | -.109 | .563 | .932 | -.034 | -.041 | .376 |
| 07 NOV66 N PERU | 6737.40 | 144.95 | .232 | 0 | .855 | -.218 | -.059 | .550 | .745 | -.132 | -.035 | .505 |
| 21 MAY66 PERU-BRAZIL | 6834.78 | 143.54 | .234 | .715 | .875 | -.182 | .045 | .513 | .707 | -.034 | -.088 | .451 |
| 09 SEP66 PERU-BRAZIL | 6853.95 | 143.38 | .250 | .629 | .855 | -.220 | -.056 | .550 | .816 | -.023 | -.E77 | .420 |
| 31 MAY66 PERU-BRAZIL | 6869.50 | 143.58 | .243 | .750 | .909 | -.262 | -.050 | .581 | .805 | .081 | .013 | .507 |
| 13 JAN66 PERU-BRAZIL | 6883.19 | 143.27 | .327 | .758 | .969 | -.239 | .168 | .644 | .913 | .138 | 0 | .596 |
| 13 OCT66 PERU BRAZIL | 6909.76 | 143.76 | .230 | .705 | .788 | -.212 | -.011 | .536 | .688 | -.110 | 0 | .4E7 |
| 27 MAR 67 BRAZIL | 7060.27 | 140.79 | 0 | .704 | .894 | -.049 | .148 | .6E4 | .643 | .0E4 | -.085 | .452 |
| 15 FEB 67 PERU-BRAZL | 7070.19 | 140.84 | .035 | .584 | .762 | -.202 | .020 | .457 | .668 | -.028 | -.171 | .066 |
| 05 JUN 66 PERU-BRAZL | 7173.52 | 140.50 | .146 | .614 | .787 | 0 | .081 | .478 | 0 | -.0E2 | -.176 | 0 |
| | AVERAGE | | .197 | .664 | .854 | -.193 | .009 | .550 | .779 | -.014 | -.075 | .430 |
| | SIGMA | | .093 | .0E3 | .068 | .062 | .090 | .059 | .103 | .0EE | .068 | .151 |
| | N | | 9 | 9 | 10 | E | 10 | 10 | 9 | 10 | 8 | 9 |

## EVENT PARAMETERS

| 10 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 23 MAR66 PERU-BRAZIL | -7.300 | -74.800 | 137 | 21 57 09.6 | .0781 | -.029 | 16 |
| 07 NOV66 N PERU | -7.800 | -75.900 | 147 | 20 31 33.0 | .0520 | -.018 | 17 |
| 21 MAY66 PERU-BRAZIL | -8.100 | -74.400 | 160 | 07 44 20.0 | .0350 | .0E1 | 1E |
| 09 SEP66 PERU-BRAZIL | -8.200 | -74.200 | 156 | 04 04 03.7 | .0394 | .002 | 20 |
| 31 MAY66 PERU-BRAZIL | -8.400 | -74.300 | 184 | 08 50 18.9 | .0602 | .039 | 19 |
| 13 JAN66 PERU-BRAZIL | -8.400 | -74.000 | 1E0 | 14 17 10.8 | .1128 | .08E | 16 |
| 13 OCT66 PERU BRAZIL | -8.E00 | -74.300 | 155 | 15 45 15.6 | .0569 | -.021 | 1E |
| 27 MAR 67 BRAZIL | -8.900 | -71.300 | 6E3 | 08 26 34.5 | .0821 | .052 | 1E |
| 15 FEB 67 PERU-BRAZL | -9.000 | -71.300 | 5E7 | 16 11 11.8 | .1177 | -.070 | 20 |
| 05 JUN 66 PERU-BRAZL | -9.700 | -70.600 | 6E8 | 19 03 10.0 | .0857 | -.070 | 13 |

11 15 67

# RELATIVE TRAVEL-TIME ANOMALIES

HERRIN66 TRAVEL-TIME TABLES — REFERENCE STATION A0

INCLUDING ELLIPTICITY

ANOMALY REGION = COAST OF PERU
DISTANCE RANGE = 6876 TO 6902 KM AZIMUTH RANGE = 148.9 TO 149.0 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18 OCT66 CST PERU | 6875.85 | 149.00 | 0 | -.010 | -.010 | .080 | .252 | 0 | 0 | .346 | .088 | -.157 |
| 17 OCT66 CST PERU | 6900.58 | 148.93 | -.115 | -.060 | .052 | .134 | .320 | 0 | -.010 | .390 | .120 | -.107 |
| 19 NOV66 CST PERU | 6901.63 | 149.53 | -.102 | 0 | 0 | .162 | 0 | 0 | 0 | 0 | 0 | 0 |
| AVERAGE | | | -.109 | -.035 | .021 | .125 | .290 | 0 | -.019 | .348 | .104 | -.132 |
| SIGMA | | | .009 | .035 | .044 | .042 | .054 | 0 | 0 | .003 | .022 | .035 |
| N | | | 2 | 2 | 2 | 3 | 2 | 0 | 1 | 2 | 0 | 2 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18 OCT66 CST PERU | 6875.85 | 149.00 | .243 | .668 | .705 | -.225 | -.046 | .543 | 0 | -.128 | .067 | 0 |
| 17 OCT66 CST PERU | 6900.58 | 148.93 | .298 | 0 | .810 | -.253 | -.012 | .556 | .789 | 0 | .001 | .402 |
| 19 NOV66 CST PERU | 6901.63 | 140.53 | 0 | 0 | 0 | 0 | 0 | 0 | .711 | -.080 | .093 | .938 |
| AVERAGE | | | .270 | .669 | .802 | -.239 | -.020 | .540 | .750 | -.104 | .038 | .569 |
| SIGMA | | | .038 | 0 | .010 | .020 | .024 | .009 | .055 | .034 | .034 | .047 |
| N | | | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 |

## EVENT PARAMETERS

| 3 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 18 OCT66 CST PERU | -10.600 | -79.500 | 30 | 08 26 07.7 | .0257 | -.011 | 15 |
| 17 OCT66 CST PERU | -10.500 | -78.600 | 39 | 23 04 22.1 | .0235 | .010 | 17 |
| 19 NOV66 CST PERU | -10.700 | -79.100 | 34 | 18 20 30.0 | .0304 | -.002 | 6 |

11 15 67 RELATIVE TRAVEL-TIME ANOMALIES

HERRIN66 TRAVEL-TIME TABLES REFERENCE STATION A0

INCLUDING ELLIPTICITY

ANOMALY REGION = PERU - BOLIVIA

DISTANCE RANGE = 7372 TO 7934 KM AZIMUTH RANGE = 142.1 TO 148.1 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 17 OCT66 PERU | 7371.94 | 148.15 | 0 | -.169 | .093 | -.177 | .240 | -.083 | -.090 | .349 | .139 | 0 |
| 10 JUN66 CST. PERU | 7446.34 | 148.06 | -.031 | -.071 | .058 | .212 | .233 | -.138 | -.105 | .274 | .151 | -.310 |
| 19 JUN66 CST. PERU | 7460.63 | 148.00 | -.110 | -.132 | .068 | .222 | .225 | -.129 | -.096 | .304 | .103 | 0 |
| 07 JUN66 PERU | 7474.92 | 147.95 | -.050 | -.152 | -.012 | .224 | .377 | -.069 | -.068 | .245 | .225 | 0 |
| 07 JUN66 PERU | 7481.10 | 148.08 | 0 | -.143 | .039 | .213 | .185 | -.081 | -.066 | .336 | .060 | 0 |
| 09 FEB66 PERU CST | 7519.91 | 147.45 | -.023 | .056 | .164 | .208 | .297 | -.046 | -.194 | .375 | .200 | -.131 |
| 19 DEC65 PERU | 7546.67 | 148.74 | 0 | 0 | 0 | 0 | .194 | 0 | -.122 | .284 | .172 | -.114 |
| 02 JUN66 S. PERU | 7709.68 | 144.06 | 0 | .017 | .060 | .171 | .282 | -.080 | -.117 | .327 | .211 | -.120 |
| 10 FEB66 PERU | 7726.73 | 148.83 | .069 | -.092 | .080 | .199 | .338 | -.110 | -.110 | .342 | .159 | 0 |
| 04 JAN66 S PERU | 7726.81 | 143.46 | -.035 | -.135 | .096 | .206 | .249 | -.127 | -.155 | .237 | .189 | -.299 |
| 09 FEB66 PERU | 7769.13 | 148.89 | .006 | 0 | .034 | .225 | .275 | -.122 | -.081 | .330 | .207 | -.315 |
| 4 SEP 66 CST PERU | 7834.50 | 147.38 | -.081 | -.138 | .015 | .173 | .277 | -.174 | -.072 | .294 | .203 | -.328 |
| 30 DEC65 S PERU | 7853.62 | 144.36 | 0 | 0 | 0 | 0 | .487 | 0 | -.003 | .350 | .262 | -.165 |
| 02 DEC65 PERU-BOL | 7886.41 | 142.71 | 0 | 0 | 0 | 0 | .366 | -.031 | -.072 | .345 | .209 | -.277 |
| 02 MAY66 PERU-BULIV | 7929.04 | 142.12 | .030 | -.124 | .058 | .301 | 0 | -.086 | -.178 | .283 | .186 | 0 |
| 15 MAR66 PERU - BOL | 7934.27 | 142.26 | .029 | 0 | .049 | .322 | .395 | -.059 | -.078 | .349 | .291 | -.214 |
| AVERAGE | | | -.020 | -.098 | .059 | .219 | .295 | -.095 | -.096 | .314 | .185 | -.227 |
| SIGMA | | | .054 | .072 | .042 | .045 | .083 | .040 | .040 | .048 | .056 | .088 |
| N | | | 10 | 11 | 13 | 13 | 15 | 14 | 14 | 16 | 16 | 10 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 17 OCT66 PERU | 7371.94 | 148.15 | .249 | .691 | .815 | -.232 | -.011 | .929 | .742 | -.055 | -.024 | .432 |
| 10 JUN66 CST. PERU | 7446.34 | 148.06 | .146 | .626 | .767 | -.388 | -.122 | .901 | .722 | -.285 | -.087 | .322 |
| 19 JUN66 CST. PERU | 7460.63 | 148.00 | .215 | .719 | .752 | -.290 | -.058 | .542 | .770 | -.234 | -.036 | .381 |
| 07 JUN66 PERU | 7474.92 | 147.95 | .093 | .613 | .799 | -.233 | -.034 | .614 | .709 | -.204 | .109 | .383 |
| 07 JUN66 PERU | 7481.10 | 148.08 | .186 | .763 | .735 | -.320 | -.091 | .591 | .665 | 0 | -.072 | .445 |
| 09 FEB66 PERU CST | 7519.91 | 147.45 | .140 | .714 | .729 | -.274 | .092 | .494 | .679 | -.112 | .058 | .298 |
| 19 DEC65 PERU | 7546.67 | 148.74 | .237 | .691 | .765 | -.192 | .021 | .907 | .656 | .001 | -.039 | .413 |
| 02 JUN66 S. PERU | 7709.68 | 144.06 | .164 | .674 | .842 | -.236 | .046 | .514 | .645 | -.091 | -.102 | .325 |
| 10 FEB66 PERU | 7726.73 | 148.83 | .182 | .791 | .785 | -.322 | .008 | .580 | .650 | 0 | -.024 | .319 |
| 04 JAN66 S PERU | 7726.81 | 143.46 | .179 | .599 | .729 | -.221 | .025 | .436 | .624 | -.099 | -.050 | .213 |
| 09 FEB66 PERU | 7769.13 | 148.89 | .199 | 0 | .704 | -.228 | .017 | .576 | .626 | -.124 | -.015 | .282 |
| 4 SEP 66 CST PERU | 7834.50 | 147.38 | .174 | .670 | .681 | -.392 | -.132 | .487 | .581 | -.323 | -.082 | .131 |
| 30 DEC65 S PERU | 7853.62 | 144.36 | .171 | .721 | .745 | -.240 | .086 | .542 | .611 | -.157 | .054 | .220 |
| 02 DEC65 PERU-BOL | 7886.41 | 142.71 | .241 | .687 | 0 | -.302 | .097 | .452 | .519 | -.019 | 0 | .224 |
| 02 MAY66 PERU-BULIV | 7929.04 | 142.12 | .087 | .684 | .674 | -.294 | .129 | .455 | 0 | .009 | -.025 | .196 |
| 15 MAR66 PERU - BOL | 7934.27 | 142.26 | .170 | .738 | .734 | -.228 | .058 | .538 | .469 | -.027 | -.045 | .219 |
| AVERAGE | | | .177 | .691 | .750 | -.274 | .012 | .524 | .654 | -.123 | -.026 | .298 |
| SIGMA | | | .047 | .053 | .047 | .059 | .078 | .055 | .075 | .106 | .058 | .097 |
| N | | | 16 | 15 | 15 | 16 | 16 | 16 | 15 | 14 | 15 | 16 |

EVENT PARAMETERS

| 16 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | ND. STA |
|---|---|---|---|---|---|---|---|
| 17 OCT66 PERU | -13.500 | -74.600 | 186 | 11 11 55.3 | .0596 | .019 | 18 |
| 10 JUN66 CST. PERU | -14.800 | -76.000 | 22 | 08 13 25.8 | .0685 | -.034 | 20 |
| 19 JUN66 CST. PERU | -14.900 | -75.900 | 29 | 15 40 47.6 | .0591 | -.012 | 19 |
| 07 JUN66 PERU | -15.000 | -75.800 | 48 | 00 59 46.6 | .0682 | .010 | 19 |
| 07 JUN66 PERU | -15.100 | -75.900 | 42 | 03 24 17.2 | .0701 | -.008 | 17 |
| 09 FEB66 PERU CST | -15.200 | -75.200 | 54 | 15 13 30.1 | .0619 | .027 | 20 |
| 19 DEC65 PERU | -14.800 | -73.600 | 94 | 20 10 23.5 | .0676 | .022 | 15 |
| 02 JUN66 S. PERU | -15.500 | -71.500 | 121 | 17 05 38.0 | .0917 | .019 | 19 |
| 10 FEB66 PERU | -16.700 | -73.900 | 13 | 10 43 30.3 | .0412 | .015 | 18 |
| 04 JAN66 S PERU | -15.400 | -70.900 | 189 | 12 48 13.2 | .0506 | -.030 | 20 |
| 09 FEB66 PERU | -16.700 | -72.900 | 33 | 03 55 00.9 | .0341 | -.002 | 18 |
| 4 SEP 66 CST PERU | -17.800 | -74.000 | 8 | 05 37 49.7 | .0926 | -.067 | 20 |
| 30 DEC65 S PERU | -16.800 | -71.200 | 118 | 06 16 03.9 | .0753 | .035 | 15 |
| 02 DEC65 PERU-BOL | -16.400 | -69.600 | 196 | 00 36 30.1 | .0709 | .008 | 14 |
| 02 MAY66 PERU-BULIV | -16.900 | -68.900 | 138 | 21 34 01.0 | .0740 | -.009 | 17 |
| 15 MAR66 PERU - BOL | -16.600 | -69.000 | 172 | 03 46 27.0 | .0570 | .031 | 19 |

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# RELATIVE TRAVEL-TIME ANOMALIES

HERRIN68TRAVEL-TIME TABLES — REFERENCE STATION A0

INCLUDING ELLIPTICITY

ANOMALY REGION = NORTHERN CHILE - BOLIVIA BORDER AREA
DISTANCE RANGE = 8083 TO 8489 KM AZIMUTH RANGE = 141.2 TO 145.9 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14 JUN66 CST N CHILE | 8083.27 | 144.15 | -.023 | -.152 | .024 | .141 | .175 | -.139 | -.249 | .286 | .036 | -.437 |
| 02 JAN66 N CHILE | 8135.77 | 143.84 | 0 | 0 | 0 | 0 | .311 | -.028 | -.124 | .366 | .225 | -.312 |
| 30 DEC65 N, CHILE | 8160.26 | 143.84 | 0 | 0 | 0 | .305 | .393 | -.010 | -.145 | .248 | .204 | -.237 |
| 02 MAR66 BOLIVIA | 8187.40 | 141.21 | .014 | -.210 | -.005 | .220 | .337 | -.139 | -.223 | .290 | .247 | -.382 |
| 11 MAR66 N CHILE 1 | 8213.76 | 143.75 | .051 | -.187 | .123 | .368 | .317 | -.112 | -.189 | .421 | .247 | -.225 |
| 27 DEC65 N CHILE | 8214.72 | 143.97 | 0 | 0 | 0 | 0 | .394 | .035 | -.087 | .402 | .230 | -.326 |
| 04 JUN66 NO CHILE | 8264.67 | 144.19 | 0 | -.259 | -.054 | 0 | 0 | -.170 | -.247 | .206 | .124 | 0 |
| 08 MAR66 CHILE - BOL | 8277.22 | 143.71 | .141 | -.160 | .003 | .281 | .351 | -.096 | -.212 | .305 | .137 | -.315 |
| 23 MAY66 CHILE-BOLIV | 8331.5V | 143.85 | 0 | 0 | .084 | .333 | .322 | .049 | -.004 | .349 | .253 | -.342 |
| 13 JAN66 N CHILE | 833V.11 | 144.42 | -.076 | -.192 | -.062 | .102 | .234 | -.087 | -.190 | .252 | .077 | 0 |
| 17 APR66 CHILE-BOLIV | 8383.31 | 143.32 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 0 |
| 12 JUL66 CHILE-BOLIV | 8406.V1 | 144.29 | -.035 | -.155 | -.082 | .165 | .179 | -.120 | -.194 | .186 | .091 | -.353 |
| 19 FEB66 CHILE BOLIV | 8446.86 | 144.46 | .003 | -.237 | -.080 | .107 | .319 | 0 | 0 | .260 | .156 | 0 |
| 04 JAN66 N CHILE | 8450.14 | 145.85 | .048 | -.137 | .109 | .261 | .299 | -.068 | -.182 | .276 | .198 | -.329 |
| 03 FEB66 CHILE-BOLIV | 846V.22 | 144.03 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 0 |
| | AVERAGE | | .016 | -.179 | .006 | .228 | .303 | -.074 | -.166 | .290 | .171 | -.326 |
| | SIGMA | | .066 | .049 | .078 | .096 | .072 | .071 | .077 | .069 | .073 | .062 |
| | N | | 8 | 9 | 10 | 10 | 12 | 12 | 12 | 13 | 13 | 10 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14 JUN66 CST N CHILE | 8083.27 | 144.15 | .014 | .680 | .529 | -.348 | .119 | .454 | .311 | -.026 | .106 | .120 |
| 02 JAN66 N CHILE | 8135.77 | 143.84 | .187 | .718 | .718 | -.317 | .187 | .541 | .476 | -.099 | .181 | .290 |
| 30 DEC65 N, CHILE | 8160.26 | 143.84 | .167 | .654 | 0 | -.297 | .109 | .428 | .360 | -.089 | .107 | .198 |
| 02 MAR66 BOLIVIA | 8187.40 | 141.21 | .076 | .660 | .507 | -.333 | .127 | .433 | .349 | -.122 | .139 | .100 |
| 11 MAR66 N CHILE 1 | 8213.76 | 143.75 | 0 | .713 | .639 | -.301 | .082 | .476 | .384 | -.132 | .101 | .037 |
| 27 DEC65 N CHILE | 8214.72 | 143.97 | .16V | .732 | .691 | -.270 | .230 | .544 | .502 | 0 | .162 | .267 |
| 04 JUN66 NO CHILE | 8264.67 | 144.19 | .054 | 0 | .531 | -.391 | .059 | .400 | .304 | -.146 | .027 | .089 |
| 08 MAR66 CHILE - BOL | 8277.22 | 143.71 | 0 | .524 | .584 | -.359 | .095 | .369 | 0 | -.212 | -.021 | 0 |
| 23 MAY66 CHILE-BOLIV | 8331.5V | 143.85 | .186 | .662 | .599 | -.299 | .107 | 0 | .496 | -.098 | .065 | .152 |
| 13 JAN66 N CHILE | 833V.11 | 144.42 | 0 | .520 | .489 | -.333 | .128 | .475 | .441 | -.101 | 0 | .074 |
| 17 APR66 CHILE-BOLIV | 8383.31 | 143.32 | 0 | 0 | .554 | -.318 | .081 | .463 | .518 | -.159 | .054 | .049 |
| 12 JUL66 CHILE-BOLIV | 8406.91 | 144.29 | .036 | .502 | .377 | -.458 | .017 | .345 | .240 | -.189 | .035 | -.040 |
| 19 FEB66 CHILE BOLIV | 8446.86 | 144.46 | .04V | 0 | .470 | -.309 | .112 | .461 | .368 | -.117 | .175 | -.033 |
| 04 JAN66 N CHILE | 8450.14 | 145.85 | .061 | .567 | .515 | -.455 | .090 | .374 | .442 | -.158 | .053 | .031 |
| 03 FEB66 CHILE-BOLIV | 846V.22 | 144.03 | 0 | 0 | .511 | -.231 | .089 | .522 | .312 | -.103 | .102 | .033 |
| | AVENAGE | | .100 | .630 | .564 | -.340 | .107 | .449 | .417 | -.124 | .092 | .097 |
| | SIGMA | | .06V | .086 | .091 | .063 | .045 | .062 | .098 | .047 | .060 | .079 |
| | N | | 10 | 11 | 14 | 15 | 15 | 14 | 14 | 14 | 14 | 14 |

## EVENT PARAMETERS

| 15 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 14 JUN66 CST N CHILE | -18.600 | -70.100 | 140 | 08 54 58.4 | .0742 | -.027 | 20 |
| 02 JAN66 N CHILE | -18.900 | -69.600 | 101 | 03 53 48.0 | .0878 | .070 | 16 |
| 30 DEC65 N, CHILE | -1V.100 | -69.500 | 185 | 16 42 44.5 | .0579 | .033 | 16 |
| 02 MAR66 BOLIVIA | -18.200 | -67.000 | 274 | 05 56 28.0 | .0467 | .005 | 20 |
| 11 MAR66 N CHILE 1 | -19.500 | -69.200 | 115 | 01 48 34.8 | .0743 | .044 | 19 |
| 27 DEC65 N CHILE | -1V.600 | -69.400 | 117 | 11 55 11.2 | .0997 | .090 | 15 |
| 04 JUN66 NO CHILE | -20.100 | -69.400 | 99 | 18 07 00.8 | .0673 | -.059 | 15 |
| 08 MAR66 CHILE - BOL | -20.000 | -68.900 | 122 | 20 46 12.0 | .0633 | -.014 | 17 |
| 23 MAY66 CHILE-BOLIV | -20.500 | -68.800 | 113 | 18 00 16.4 | .0753 | .055 | 17 |
| 13 JAN66 N CHILE | -20.800 | -69.300 | 110 | 19 26 24.0 | .0650 | -.037 | 17 |
| 17 APR66 CHILE-BOLIV | -20.700 | -68.100 | 61 | 00 38 37.0 | .0463 | -.004 | 8 |
| 12 JUL66 CHILE-BOLIV | -21.300 | -68.900 | 99 | 08 01 37.0 | .1022 | -.886 | 20 |
| 19 FEB66 CHILE BOLIV | -21.700 | -68.900 | 112 | 02 48 14.8 | .0673 | -.036 | 16 |
| 04 JAN66 N CHILE | -22.300 | -70.200 | 52 | 06 29 27.0 | .0524 | -.011 | 20 |
| 03 FEB66 CHILE-BOLIV | -21.700 | -68.400 | 116 | 00 47 19.2 | .0717 | -.003 | 9 |

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# RELATIVE TRAVEL-TIME ANOMALIES

HERRIN(68)TRAVEL-TIME TABLES — INCLUDING ELLIPTICITY — REFERENCE STATION A0

ANOMALY REGION = NORTHERN CHILE - ARGENTINA BORDER AREA
DISTANCE RANGE = 8535 TO 8975 KM  AZIMUTH RANGE = 142.1 TO 147.6 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 DEC65 N CHILE | 8534.54 | 144.43 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -.329 |
| 11 MAR66 N CHILE 2 | 8633.81 | 145.60 | -.019 | -.156 | .009 | .221 | .234 | -.008 | -.216 | .228 | .705 | -.350 |
| 01 MAR66 N CHILE | 8642.08 | 144.49 | .053 | -.207 | .102 | .207 | .331 | -.069 | -.166 | .364 | .154 | -.354 |
| 26 OCT65 NO CHILE | 8661.54 | 144.74 | 0 | 0 | 0 | 0 | .300 | .008 | .002 | .296 | .274 | -.265 |
| 19 JUL66 ARGENTINA | 8690.76 | 143.34 | -.035 | -.170 | .035 | .205 | .252 | -.133 | -.220 | .233 | .143 | -.386 |
| 07 FEB66 CHILE-ARG | 8765.59 | 145.65 | .001 | -.153 | .031 | .169 | .243 | -.129 | -.144 | .218 | .213 | 0 |
| 08 FEB66 CHILE-ANG | 8767.33 | 144.21 | .006 | -.184 | -.078 | .156 | .274 | -.157 | -.187 | .173 | .140 | -.309 |
| 04 JAN66 CHILE-ARG | 8787.30 | 145.23 | -.055 | -.233 | -.122 | .151 | 0 | 0 | -.228 | 0 | .134 | 0 |
| 28 FEB66 N CHILE | 8814.64 | 147.58 | .121 | -.215 | .004 | .155 | .200 | -.062 | 0 | .202 | .193 | -.244 |
| 26 OCT65 ARGENT-A | 8833.81 | 142.33 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .257 | .308 | 0 |
| 31 JAN66 SALTA ARGEN | 8959.66 | 142.10 | .087 | .010 | -.001 | .270 | .290 | -.155 | -.262 | .231 | .184 | 0 |
| 14 APR66 SALTA ARG. | 8974.57 | 142.27 | .020 | -.141 | .060 | .109 | .278 | .052 | -.151 | .213 | .259 | -.291 |
| AVERAGE | | | .020 | -.161 | .004 | .191 | .276 | -.001 | -.175 | .235 | .197 | -.316 |
| SIGMA | | | .058 | .071 | .068 | .039 | .054 | .073 | .077 | .040 | .060 | .848 |
| N | | | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 10 | 11 | 8 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 DEC65 N CHILE | 8534.54 | 144.43 | .048 | 0 | .467 | -.374 | -.049 | .307 | .364 | -.076 | 0 | .038 |
| 11 MAR66 N CHILE 2 | 8633.81 | 145.60 | 0 | .535 | .429 | -.388 | .118 | .380 | .461 | -.160 | .068 | .040 |
| 01 MAR66 N CHILE | 8642.08 | 144.49 | .049 | .457 | .435 | -.357 | .128 | .330 | .249 | -.009 | .085 | -.158 |
| 26 OCT65 NO CHILE | 8661.54 | 144.74 | .078 | 0 | .334 | -.460 | .092 | .234 | .337 | -.075 | .094 | -.035 |
| 19 JUL66 ARGENTINA | 8690.76 | 143.34 | -.027 | .479 | .414 | -.352 | .144 | .342 | .325 | -.112 | .053 | -.806 |
| 07 FEB66 CHILE-ARG | 8765.59 | 145.65 | -.007 | .423 | .361 | -.359 | .018 | .326 | .455 | -.077 | .048 | -.039 |
| 08 FEB66 CHILE-ANG | 8767.33 | 144.21 | .042 | .398 | .279 | -.499 | -.014 | .208 | .232 | -.216 | -.062 | -.184 |
| 04 JAN66 CHILE-ARG | 8787.30 | 145.23 | 0 | .429 | .420 | -.300 | .007 | .287 | 0 | -.101 | .058 | .023 |
| 28 FEB66 N CHILE | 8814.64 | 147.58 | -.006 | .352 | .475 | 0 | .054 | .430 | .284 | -.193 | -.014 | -.134 |
| 26 OCT65 ARGENT-A | 8833.81 | 142.33 | 0 | .560 | .558 | 0 | .041 | .311 | 0 | -.153 | 0 | .027 |
| 31 JAN66 SALTA ARGEN | 8959.66 | 142.10 | -.004 | .426 | .393 | -.301 | .062 | .223 | .260 | -.095 | -.033 | -.034 |
| 14 APR66 SALTA ARG. | 8974.57 | 142.27 | .000 | .456 | 0 | -.300 | -.014 | .281 | .395 | -.190 | .091 | -.020 |
| AVERAGE | | | .019 | .492 | .415 | -.385 | .056 | .321 | .332 | -.124 | .037 | -.039 |
| SIGMA | | | .035 | .062 | .075 | .056 | .061 | .087 | .080 | .047 | .054 | .074 |
| N | | | 9 | 10 | 11 | 10 | 12 | 12 | 10 | 12 | 10 | 12 |

## EVENT PARAMETERS

| 12 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 16 DEC65 N CHILE | -22.400 | -68.500 | 100 | 22 46 30.0 | .0851 | .035 | 9 |
| 11 MAR66 N CHILE 2 | -23.700 | -69.200 | 67 | 09 38 42.0 | .0510 | .016 | 19 |
| 01 MAR66 N CHILE | -23.300 | -68.100 | 120 | 12 21 51.4 | .0534 | .009 | 20 |
| 26 OCT65 NO CHILE | -24.400 | -70.200 | 55 | 12 15 08.3 | .0813 | .035 | 15 |
| 19 JUL66 ARGENTINA | -23.200 | -66.800 | 183 | 07 25 27.6 | .0404 | .005 | 20 |
| 07 FEB66 CHILE-ARG | -24.000 | -68.700 | 94 | 14 59 48.0 | .0412 | .000 | 19 |
| 08 FEB66 CHILE-ANG | -24.200 | -67.300 | 173 | 14 54 30.5 | .0790 | .062 | 20 |
| 04 JAN66 CHILE-ARG | -24.000 | -68.200 | 90 | 14 51 54.0 | .0575 | .024 | 14 |
| 28 FEB66 N CHILE | -20.000 | -70.400 | 87 | 21 38 52.4 | .0651 | .015 | 18 |
| 26 OCT65 ARGENT-A | -23.900 | -65.200 | 150 | 19 31 37.0 | .0849 | .050 | 8 |
| 31 JAN66 SALTA ARGEN | -24.800 | -64.400 | 43 | 14 01 25.4 | .0678 | .002 | 19 |
| 14 APR66 SALTA ARG. | -25.000 | -64.500 | 25 | 06 19 13.6 | .0461 | .013 | 19 |

11 15 67 RELATIVE TRAVEL-TIME ANOMALIES

HERRIN TRAVEL-TIME TABLES REFERENCE STATION AB

INCLUDING ELLIPTICITY

ANOMALY REGION = CENTRAL CHILE - ARGENTINA BORDER AREA
DISTANCE RANGE = 9112 TO 9954 KM AZIMUTH RANGE = 140.4 TO 154.6 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 23 OCT65 C CHILE CST | 9111.77 | 140.95 | .134 | 0 | -.048 | .374 | 0 | -.035 | -.053 | .265 | .215 | -.177 |
| 12 JUN66 ARGENTINA | 9199.04 | 147.21 | -.014 | -.134 | -.015 | 0 | .211 | -.155 | -.189 | .168 | .224 | -.241 |
| 13 NOV65 ARGENTINA | 9251.57 | 147.14 | 0 | 0 | 0 | 0 | .285 | 0 | -.142 | .310 | .155 | -.267 |
| 08 JUN66 CHILE-ARGEN | 9323.28 | 148.40 | -.047 | -.183 | -.085 | .152 | .125 | -.159 | -.259 | .156 | .081 | -.410 |
| 11 DEC65 ARGENTINA | 9327.48 | 147.40 | 0 | 0 | 0 | .254 | .329 | -.035 | -.112 | .241 | .244 | -.279 |
| 10 SEP66 EST C CHILE | 9331.21 | 151.18 | -.042 | -.103 | -.040 | .164 | .203 | -.043 | -.260 | .176 | .218 | -.242 |
| 10 APR 66 C CHILE | 9340.66 | 150.47 | .035 | -.104 | -.004 | .120 | .183 | -.058 | -.057 | .117 | 0 | 0 |
| 14 OCT65 C CHILE | 9403.51 | 151.18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .090 | -.207 |
| 08 MAR66 S J ARGENT | 9421.75 | 148.35 | -.044 | -.187 | -.006 | .169 | .245 | -.113 | -.200 | .201 | .105 | -.247 |
| 02 DEC65 ARGENTINA | 9425.77 | 148.27 | 0 | 0 | 0 | .178 | .255 | -.141 | -.157 | .130 | .260 | -.284 |
| 23 OCT65 C CHILE | 9428.53 | 150.90 | 0 | -.139 | 0 | .252 | .255 | -.068 | 0 | 0 | .197 | -.293 |
| 10 NOV66 SAN JUAN AR | 9490.05 | 148.45 | -.014 | -.191 | -.025 | 0 | .208 | -.090 | -.171 | .187 | .196 | -.279 |
| 12 MAR66 S J ARGENT | 9512.93 | 147.31 | .026 | -.191 | .038 | .256 | .313 | -.066 | -.150 | .252 | .352 | -.321 |
| 29 APR66 CHILE-ARGEN | 9745.69 | 151.40 | -.052 | -.202 | -.015 | .155 | .177 | -.112 | -.184 | .177 | .225 | -.300 |
| 13 APR66 CST C CHILE | 9955.74 | 154.57 | -.008 | -.111 | -.008 | .155 | .194 | -.108 | -.174 | .201 | .171 | -.280 |
| | AVERAGE | | .003 | -.152 | -.023 | .204 | .232 | -.095 | -.170 | .199 | .201 | -.276 |
| | SIGMA | | .052 | .032 | .033 | .073 | .050 | .042 | .055 | .055 | .071 | .054 |
| | N | | 10 | 10 | 10 | 11 | 13 | 13 | 13 | 13 | 14 | 14 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 23 OCT65 C CHILE CST | 9111.77 | 140.95 | .058 | 0 | .260 | -.350 | .087 | .314 | .341 | -.007 | -.306 | -.128 |
| 12 JUN66 ARGENTINA | 9199.04 | 147.21 | -.010 | .392 | .366 | -.354 | .134 | .301 | .255 | -.085 | .148 | .034 |
| 13 NOV65 ARGENTINA | 9251.57 | 147.14 | -.102 | 0 | 0 | -.354 | .001 | .308 | 0 | -.101 | -.015 | -.083 |
| 08 JUN66 CHILE-ARGEN | 9323.28 | 148.40 | -.135 | .348 | .251 | -.395 | -.068 | .261 | .104 | -.211 | -.003 | -.219 |
| 11 DEC65 ARGENTINA | 9327.48 | 148.40 | -.018 | .490 | .391 | -.425 | .013 | 0 | .385 | -.125 | .071 | .048 |
| 10 SEP66 EST C CHILE | 9331.21 | 151.18 | .007 | 0 | 0 | -.373 | .050 | .299 | 0 | -.152 | -.015 | -.053 |
| 10 APR 66 C CHILE | 9340.66 | 150.47 | -.078 | 0 | .346 | -.285 | .050 | .292 | .328 | -.027 | .053 | -.020 |
| 14 OCT65 C CHILE | 9403.51 | 151.18 | -.095 | 0 | .190 | -.332 | -.149 | .208 | .180 | -.154 | -.007 | -.211 |
| 08 MAR66 S J ARGENT | 9421.75 | 148.35 | 0 | .428 | .264 | -.471 | .042 | .345 | .302 | -.093 | .044 | -.210 |
| 02 DEC65 ARGENTINA | 9425.77 | 148.27 | -.083 | .395 | .172 | -.412 | -.014 | .259 | 0 | -.186 | -.017 | .010 |
| 23 OCT65 C CHILE | 9428.53 | 150.90 | .065 | 0 | .178 | -.364 | -.200 | .227 | 0 | -.160 | .083 | 0 |
| 10 NOV66 SAN JUAN AR | 9490.05 | 148.45 | -.041 | .411 | .318 | -.408 | -.046 | .244 | .395 | -.153 | .028 | -.059 |
| 12 MAR66 S J ARGENT | 9512.93 | 147.31 | 0 | .470 | .257 | -.477 | -.015 | .344 | .342 | 0 | .027 | -.007 |
| 29 APR66 CHILE-ARGEN | 9745.69 | 151.40 | -.035 | .439 | .155 | -.404 | -.105 | .204 | .225 | -.123 | .001 | -.252 |
| 13 APR66 CST C CHILE | 9955.74 | 154.57 | -.044 | .416 | .255 | -.411 | 0 | .281 | .315 | -.179 | .023 | -.178 |
| | AVERAGE | | -.039 | .421 | .262 | -.388 | -.015 | .280 | .299 | -.120 | .024 | -.077 |
| | SIGMA | | .061 | .043 | .075 | .051 | .092 | .047 | .075 | .066 | .060 | .100 |
| | N | | 13 | 9 | 13 | 13 | 14 | 14 | 11 | 14 | 15 | 14 |

EVENT PARAMETERS

| 15 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 23 OCT65 C CHILE CST | -29.400 | -71.600 | 33 | 06 53 32.8 | .0901 | .049 | 17 |
| 12 JUN66 ARGENTINA | -29.000 | -68.400 | 95 | 19 26 21.6 | .0691 | .029 | 19 |
| 13 NOV65 ARGENTINA | -29.400 | -68.100 | 45 | 17 49 41.7 | .0457 | .010 | 12 |
| 08 JUN66 CHILE-ARGEN | -30.600 | -69.300 | 109 | 09 56 33.4 | .0832 | -.070 | 20 |
| 11 DEC65 ARGENTINA | -29.700 | -67.000 | 20 | 13 40 13.0 | .0716 | .053 | 14 |
| 10 SEP66 CST C CHILE | -31.700 | -72.000 | 20 | 14 12 44.2 | .0414 | -.002 | 17 |
| 10 APR 66 C CHILE | -31.500 | -71.200 | 64 | 16 36 14.5 | .0635 | .025 | 17 |
| 14 OCT65 C CHILE | -32.300 | -71.700 | 30 | 03 28 08.3 | .0957 | -.040 | 11 |
| 08 MAR66 S J ARGENT | -31.100 | -68.600 | 102 | 02 32 52.7 | .0395 | -.003 | 19 |
| 02 DEC65 ARGENTINA | -31.300 | -68.500 | 45 | 10 16 27.0 | .0491 | -.019 | 16 |
| 23 OCT65 C CHILE | -32.400 | -71.300 | 67 | 15 34 47.2 | .0735 | -.006 | 13 |
| 10 NOV66 SAN JUAN AR | -31.900 | -68.400 | 113 | 03 02 32.5 | .0321 | -.002 | 19 |
| 12 MAR66 S J ARGENT | -31.600 | -67.100 | 128 | 06 58 37.5 | .0571 | .037 | 18 |
| 29 APR66 CHILE-ARGEN | -35.300 | -70.700 | 93 | 03 32 20.2 | .0631 | -.041 | 20 |
| 13 APR66 CST C CHILE | -38.200 | -73.200 | 40 | 03 35 18.3 | .0253 | -.009 | 19 |

11 15 67

# RELATIVE TRAVEL-TIME ANOMALIES

HERRIN66TRAVEL-TIME TABLES — INCLUDING ELLIPTICITY — REFERENCE STATION AO

ANOMALY REGION = GULF OF CALIF
DISTANCE RANGE = 2244 TO 2462 KM AZIMUTH RANGE = 186.5 TO 191.9 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 02 SEP66 GULF CALIF | 2243.83 | 191.93 | 0 | -.063 | .028 | 0 | 0 | -.111 | .047 | .089 | 0 | -.220 |
| 30 NOV 65 G OF CAL | 2317.60 | 189.08 | -.044 | -.123 | -.020 | -.014 | .032 | -.159 | -.156 | -.060 | .041 | -.331 |
| 14 DEC 65 G OF CAL | 2327.40 | 188.80 | 0 | 0 | 0 | 0 | 0 | 0 | -.181 | 0 | -.041 | -.308 |
| 01 MAR 67 G OF CAL | 2393.39 | 188.61 | -.100 | -.030 | .056 | .001 | .022 | .005 | -.034 | .067 | -.079 | -.163 |
| 25 DEC 65 G OF CAL | 2407.33 | 188.59 | 0 | 0 | 0 | .091 | .016 | 0 | -.108 | .001 | -.024 | -.198 |
| 18 MAY 66 G OF CAL | 2417.25 | 188.81 | 0 | -.049 | .002 | .041 | .031 | .023 | -.046 | .054 | .015 | -.142 |
| 18 MAY 66 G OF CAL | 2462.47 | 188.48 | 0 | .046 | .043 | .142 | .029 | .071 | -.115 | .043 | .096 | -.109 |
| | AVERAGE | | -.072 | -.044 | .022 | .068 | .026 | -.034 | -.085 | .046 | .001 | -.207 |
| | SIGMA | | .039 | .061 | .031 | .058 | .007 | .097 | .078 | .055 | .063 | .067 |
| | N | | 2 | 5 | 5 | 5 | 5 | 5 | 7 | 6 | 6 | 7 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 02 SEP66 GULF CALIF | 2243.83 | 191.93 | .171 | .272 | .237 | -.226 | .149 | .25. | .190 | .185 | 0 | .238 |
| 30 NOV 65 G OF CAL | 2317.60 | 189.08 | .045 | .097 | .611 | .022 | -.007 | .144 | .395 | -.001 | -.206 | .279 |
| 14 DEC 65 G OF CAL | 2327.40 | 188.80 | -.040 | .128 | .252 | -.058 | -.079 | .119 | .504 | .057 | -.206 | .384 |
| 01 MAR 67 G OF CAL | 2393.39 | 188.61 | .103 | .307 | .313 | .022 | -.238 | .225 | .512 | .047 | -.280 | .577 |
| 25 DEC 65 G OF CAL | 2407.33 | 188.59 | -.004 | .202 | .464 | .006 | -.223 | .101 | 0 | .174 | -.139 | .367 |
| 18 MAY 66 G OF CAL | 2417.25 | 188.81 | .045 | .304 | .495 | -.104 | -.103 | .180 | .431 | .031 | -.113 | .480 |
| 18 MAY 66 G OF CAL | 2462.47 | 188.48 | .020 | .414 | .553 | .017 | -.151 | .145 | 0 | -.043 | -.270 | .560 |
| | AVERAGE | | .037 | .246 | .412 | -.045 | -.106 | .167 | .406 | .066 | -.214 | .414 |
| | SIGMA | | .089 | .111 | .147 | .093 | .128 | .057 | .131 | .088 | .075 | .133 |
| | N | | 7 | 7 | 7 | 7 | 7 | 7 | 5 | 7 | 6 | 7 |

## EVENT PARAMETERS

| 7 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 02 SEP66 GULF CALIF | 26.800 | -110.800 | 34 | 21 20 17.0 | .1401 | -.003 | 15 |
| 30 NOV 65 G OF CAL | 26.000 | -109.800 | 49 | 12 34 55.0 | .0921 | -.037 | 20 |
| 14 DEC 65 G OF CAL | 25.900 | -109.700 | 49 | 17 27 01.7 | .0820 | -.043 | 13 |
| 01 MAR 67 G OF CAL | 25.300 | -109.700 | 33 | 01 20 04.3 | .0720 | -.017 | 20 |
| 25 DEC 65 G OF CAL | 25.100 | -108.900 | 49 | 12 34 19.0 | .0670 | -.007 | 15 |
| 18 MAY 66 G OF CAL | 25.000 | -109.000 | 33 | 07 32 07.3 | .0455 | .010 | 19 |
| 18 MAY 66 G OF CAL | 24.600 | -108.900 | 33 | 08 04 59.2 | .0900 | .041 | 18 |

11 15 67

# R E L A T I V E  T R A V E L - T I M E  A N O M A L I E S

HERRIN66 TRAVEL-TIME TABLES  REFERENCE STATION  AO

INCLUDING ELLIPTICITY

ANOMALY REGION = S CHILE

DISTANCE RANGE = 10110 TO 10741 KM  AZIMUTH RANGE = 156.2 TO 158.1 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 MAR 67 S CHILE | 10110.43 | 156.21 | -.032 | -.124 | -.048 | .113 | .205 | -.166 | -.198 | .242 | .095 | -.224 |
| 25 APR 66 S CHILE | 10305.86 | 157.77 | -.019 | -.182 | -.029 | .081 | .242 | -.190 | -.245 | .283 | .114 | 0 |
| 17 MAY66 CST S CHILE | 10494.11 | 158.10 | -.013 | -.169 | -.017 | .197 | .175 | -.129 | 0 | .212 | .145 | -.300 |
| 28 NOV 65 S CHILE | 10741.90 | 158.83 | -.010 | -.207 | -.084 | .164 | .190 | -.183 | -.282 | .207 | .074 | -.208 |
| AVERAGE | | | -.019 | -.170 | -.045 | .139 | .203 | -.167 | -.215 | .236 | .108 | -.244 |
| SIGMA | | | .010 | .035 | .029 | .052 | .029 | .028 | .026 | .035 | .029 | .049 |
| N | | | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 3 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 MAR 67 S CHILE | 10110.43 | 156.21 | .049 | .397 | .184 | -.458 | 0 | .359 | -.001 | -.190 | .232 | 0 |
| 25 APR 66 S CHILE | 10305.86 | 157.77 | .017 | .451 | .117 | -.633 | -.161 | .389 | .100 | -.284 | .072 | -.188 |
| 17 MAY66 CST S CHILE | 10494.11 | 158.10 | -.053 | .452 | 0 | 0 | 0 | .318 | 0 | -.063 | .074 | 0 |
| 28 NOV 65 S CHILE | 10741.90 | 158.83 | .133 | .451 | .150 | -.282 | .168 | .274 | -.108 | -.069 | .389 | -.143 |
| AVERAGE | | | .035 | .438 | .151 | -.458 | .004 | .335 | -.003 | -.150 | .192 | -.165 |
| SIGMA | | | .077 | .027 | .033 | .175 | .233 | .050 | .104 | .107 | .151 | .032 |
| N | | | 4 | 4 | 3 | 3 | 2 | 4 | 3 | 4 | 4 | 2 |

## E V E N T  P A R A M E T E R S

| 4 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 13 MAR 67 S CHILE | -40.100 | -74.500 | 33 | 6 06 54.3 | .0249 | .004 | 18 |
| 25 APR 66 S CHILE | -42.300 | -75.600 | 33 | 4 32 30.0 | .0797 | -.029 | 19 |
| 17 MAY66 CST S CHILE | -44.000 | -75.200 | 33 | 16 58 17.0 | .0562 | -.004 | 14 |
| 28 NOV 65 S CHILE | -45.000 | -72.400 | 33 | 3 56 45.9 | .0845 | .025 | 20 |

11 15 67

# R E L A T I V E  T R A V E L - T I M E  A N O M A L I E S

HERRIN68TRAVEL-TIME TABLES  REFERENCE STATION 40

INCLUDING ELLIPTICITY

ANOMALY REGION = MISC. WESTERN MEXICO
DISTANCE RANGE = 2814 TO 4048 KM  AZIMUTH RANGE = 176.4 TO 186.4 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 23 MAY 66 REVILLAGIG | 2813.98 | 186.41 | -.164 | -.075 | .075 | .016 | .034 | -.105 | .015 | .140 | -.101 | -.151 |
| 26 JAN 67 REVILLAGIG | 2815.48 | 186.44 | -.160 | -.047 | .111 | .005 | -.014 | -.085 | .050 | .117 | -.211 | -.227 |
| 22 MAY66 REVILLA GIG | 2830.18 | 186.38 | -.139 | -.026 | .104 | .007 | .025 | -.034 | .032 | .171 | -.136 | -.066 |
| 22 MAY 66 REVILLAGIG | 2847.09 | 186.36 | -.149 | -.106 | .074 | -.012 | .048 | -.054 | .031 | .081 | .016 | -.117 |
| 23 JAN 67 REVILLAGIG | 2904.18 | 186.43 | 0 | -.113 | .135 | .015 | 0 | -.169 | -.078 | .115 | .010 | -.214 |
| 08 AUG66 REV GIG IS | 3042.18 | 183.86 | -.164 | .024 | .092 | .179 | .043 | -.041 | .035 | .143 | -.079 | 0 |
| 11 JUN 66 REVILLAGIG | 3053.23 | 183.85 | -.164 | -.136 | -.009 | -.041 | -.096 | -.211 | -.187 | .044 | -.098 | -.228 |
| 06 DEC65 J4LISCO MEX | 3082.06 | 181.79 | 0 | 0 | 0 | -.094 | .034 | -.024 | .048 | .160 | 0 | -.227 |
| 30 APR 66 J4LISCO | 3092.95 | 180.97 | .007 | .012 | .122 | .103 | .813 | -.095 | .085 | .177 | -.075 | -.169 |
| 06 DEC 65 J4LISCO | 3093.46 | 181.58 | 0 | 0 | 0 | 0 | -.044 | 0 | 0 | 0 | -.147 | -.163 |
| 30 AUG66 J4LISCO | 3104.51 | 181.57 | 0 | 0 | .108 | 0 | 0 | -.019 | .006 | .157 | -.166 | -.214 |
| 11 MAR 66 MICHOACAN | 3483.31 | 176.80 | -.107 | -.079 | .026 | -.004 | -.805 | -.155 | -.033 | .094 | -.068 | -.239 |
| 03 SEP 66 OFF C MEX | 4047.80 | 176.44 | 0 | .006 | -.803 | .077 | .099 | -.158 | -.005 | .129 | -.081 | -.251 |
| | AVERAGE | | -.140 | -.054 | .076 | .054 | .012 | -.098 | .007 | .127 | -.096 | -.189 |
| | SIGMA | | .061 | .057 | .050 | .045 | .051 | .047 | .055 | .039 | .063 | .056 |
| | N | | 8 | 10 | 11 | 11 | 11 | 12 | 12 | 12 | 12 | 12 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | F3 | F4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 23 MAY 66 REVILLAGIG | 2813.98 | 186.41 | .071 | .407 | .458 | -.415 | -.117 | .224 | .131 | -.291 | -.095 | .226 |
| 26 JAN 67 REVILLAGIG | 2815.48 | 186.44 | .078 | .379 | .468 | -.444 | -.105 | .277 | .017 | -.238 | .044 | .343 |
| 22 MAY66 REVILLA GIG | 2830.18 | 186.38 | .186 | .483 | .470 | -.364 | -.135 | .193 | .113 | -.241 | -.023 | .320 |
| 22 MAY 66 REVILLAGIG | 2847.09 | 186.36 | .164 | .464 | .474 | -.293 | -.171 | .192 | .042 | -.268 | .016 | .475 |
| 23 JAN 67 REVILLAGIG | 2904.18 | 186.43 | .095 | .376 | .438 | -.501 | -.339 | .111 | .030 | -.489 | -.191 | .348 |
| 08 AUG66 REV GIG IS | 3042.18 | 183.86 | .193 | .340 | .496 | -.289 | -.222 | .259 | .235 | -.412 | -.110 | .376 |
| 11 JUN 66 REVILLAGIG | 3053.23 | 183.85 | -.019 | .382 | .360 | -.400 | -.230 | .129 | .092 | -.503 | -.203 | .251 |
| 06 DEC65 J4LISCO MEX | 3082.06 | 181.79 | .164 | .479 | .384 | -.425 | -.235 | .215 | 0 | 0 | -.203 | .413 |
| 30 APR 66 J4LISCO | 3092.95 | 180.97 | .211 | .513 | .450 | -.260 | -.219 | .325 | 0 | -.351 | -.098 | .525 |
| 06 DEC 65 J4LISCO | 3093.46 | 181.58 | .148 | .473 | .459 | -.386 | -.170 | .260 | .154 | -.349 | -.077 | 0 |
| 30 AUG66 J4LISCO | 3104.51 | 181.57 | .220 | .535 | .393 | -.407 | -.115 | .300 | 0 | -.446 | -.134 | .454 |
| 11 MAR 66 MICHOACAN | 3483.31 | 176.80 | 0 | .407 | .286 | -.333 | -.131 | .244 | .156 | -.337 | -.099 | .362 |
| 03 SEP 66 OFF C MEX | 4047.80 | 176.44 | .047 | 0 | 0 | -.338 | -.134 | .207 | .326 | -.256 | -.204 | .327 |
| | AVERAGE | | .130 | .453 | .428 | -.374 | -.179 | .227 | .138 | -.348 | -.106 | .368 |
| | SIGMA | | .078 | .061 | .061 | .069 | .068 | .063 | .097 | .095 | .083 | .088 |
| | N | | 12 | 12 | 12 | 13 | 13 | 13 | 10 | 12 | 13 | 12 |

# E V E N T  P A R A M E T E R S

| 13 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | 4V. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 23 MAY 66 REVILLAGIG | 21.400 | -108.700 | 58 | 11 51 30.0 | .0441 | -.008 | 20 |
| 26 JAN 67 REVILLAGIG | 21.400 | -108.900 | 33 | 06 04 33.9 | .0693 | .001 | 20 |
| 22 MAY66 REVILLA GIG | 21.200 | -108.700 | 53 | 07 42 50.0 | .0545 | .029 | 20 |
| 22 MAY 66 REVILLAGIG | 21.100 | -108.700 | 48 | 09 29 23.0 | .0650 | .024 | 20 |
| 23 JAN 67 REVILLAGIG | 19.900 | -109.300 | 56 | 20 25 38.3 | .0878 | -.056 | 18 |
| 08 AUG66 REV GIG IS | 19.300 | -108.100 | 33 | 08 02 45.8 | .0614 | .035 | 19 |
| 11 JUN 66 REVILLAGIG | 19.200 | -108.100 | 45 | 02 37 39.0 | .0946 | -.082 | 20 |
| 06 DEC65 J4LISCO MEX | 18.900 | -107.180 | 37 | 11 34 53.7 | .0502 | .001 | 14 |
| 30 APR 66 J4LISCO | 18.800 | -106.700 | 54 | 13 01 19.0 | .0741 | .051 | 19 |
| 06 DEC 65 J4LISCO | 18.800 | -107.000 | 40 | 18 42 33.2 | .0335 | .008 | 12 |
| 30 AUG66 J4LISCO | 18.700 | -107.000 | 54 | 23 37 19.0 | .0650 | .017 | 15 |
| 11 MAR 66 MICHOACAN | 19.300 | -104.500 | 33 | 09 49 27.0 | .0541 | -.020 | 19 |
| 03 SEP 66 OFF C MEX | 18.200 | -104.200 | 47 | 16 24 20.7 | .0757 | .005 | 17 |

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# RELATIVE TRAVEL-TIME ANOMALIES

HERRIN(68)TRAVEL-TIME TABLES — REFERENCE STATION AO

INCLUDING ELLIPTICITY

ANOMALY REGION = GALAPAGOS REGION
DISTANCE RANGE = 4946 TO 9200 KM AZIMUTH RANGE = 158.3 TO 179.8 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | O1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 AUG66 E CENT PACF | 4946.19 | 179.83 | 0 | -.160 | .036 | 0 | -.002 | 0 | 0 | .167 | -.126 | 0 |
| 26 JAN66 GALAPAGOS I | 4989.33 | 164.43 | -.106 | 0 | .045 | .001 | .074 | 0 | -.044 | .149 | -.067 | -.120 |
| 05 DEC 66 GALAPAGOS | 4986.55 | 167.74 | -.003 | -.064 | .068 | .039 | .818 | -.100 | -.023 | .060 | .005 | -.113 |
| 14 NOV 65 GALAPAGOS | 9200.02 | 158.34 | 0 | 0 | 0 | 0 | .174 | 0 | 0 | .200 | .095 | -.174 |
| | AVERAGE | | -.100 | -.112 | .050 | .060 | .066 | -.100 | -.044 | .149 | -.023 | -.138 |
| | SIGMA | | .009 | .060 | .016 | .030 | .079 | 0 | .029 | .091 | .094 | .032 |
| | N | | 2 | 2 | 3 | 2 | 4 | 1 | 2 | 4 | 4 | 3 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 AUG66 E CENT PACF | 4946.19 | 179.83 | .137 | .462 | 0 | -.386 | -.219 | .207 | 0 | -.526 | -.116 | 0 |
| 26 JAN66 GALAPAGOS I | 4989.33 | 164.43 | .198 | .536 | .634 | -.360 | -.174 | .309 | .611 | -.463 | -.166 | .344 |
| 05 DEC 66 GALAPAGOS | 4986.55 | 167.74 | .103 | .428 | .522 | -.224 | -.139 | .463 | .417 | -.090 | .013 | .500 |
| 14 NOV 65 GALAPAGOS | 9200.02 | 158.34 | .298 | .408 | .551 | -.032 | -.164 | .917 | .643 | 0 | .010 | .442 |
| | AVERAGE | | .174 | .450 | .569 | -.258 | -.174 | .394 | .630 | -.360 | -.069 | .429 |
| | SIGMA | | .006 | .056 | .056 | .169 | .034 | .113 | .029 | .236 | .091 | .079 |
| | N | | 4 | 4 | 3 | 4 | 4 | 4 | 3 | 3 | 4 | 3 |

## EVENT PARAMETERS

| 4 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 10 AUG66 E CENT PACF | 2.100 | -103.300 | 33 | 17 47 42.0 | .0851 | -.062 | 12 |
| 26 JAN66 GALAPAGOS I | 2.700 | -99.300 | 33 | 07 39 56.0 | .0629 | -.024 | 18 |
| 05 DEC 66 GALAPAGOS | 2.300 | -97.600 | 33 | 02 36 53.5 | .0765 | .020 | 20 |
| 14 NOV 65 GALAPAGOS | 1.700 | -00.600 | 33 | 03 11 23.0 | .1005 | .060 | 13 |

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# RELATIVE TRAVEL-TIME ANOMALIES

HERRIN68 TRAVEL-TIME TABLES — REFERENCE STATION A0

INCLUDING ELLIPTICITY

ANOMALY REGION = EAST CENT PACIFIC AND NORTH EASTER CORDILLERA
DISTANCE RANGE = 5404 TO 5667 KM AZIMUTH RANGE = 177.4 TO 179.6 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21 JUL66 ESTR-GALUP | 5403.87 | 177.51 | -.050 | -.093 | .110 | .134 | .127 | -.171 | -.025 | .174 | -.098 | -.137 |
| 20 JUN 66 N EASTER I | 5415.29 | 177.39 | -.138 | -.073 | .028 | .050 | -.001 | -.249 | .014 | .142 | -.153 | -.197 |
| 06 JUL 66 N EASTER I | 5457.40 | 178.30 | -.087 | -.089 | 0 | .102 | .105 | -.177 | .024 | .236 | .013 | 0 |
| 02 SEP66 N EASTER CD | 5467.03 | 179.59 | -.072 | -.086 | .046 | .054 | .084 | -.111 | -.024 | .194 | -.005 | -.064 |
| AVERAGE | | | -.087 | -.086 | .061 | .088 | .079 | -.177 | -.003 | .186 | -.061 | -.133 |
| SIGMA | | | .037 | .009 | .043 | .040 | .056 | .056 | .025 | .039 | .078 | .067 |
| N | | | 4 | 4 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 3 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21 JUL66 ESTR-GALUP | 5403.87 | 177.51 | .143 | .619 | .736 | 0 | -.190 | .393 | 0 | -.648 | -.201 | .226 |
| 20 JUN 66 N EASTER I | 5415.29 | 177.39 | .069 | .559 | .612 | -.506 | -.246 | .316 | .536 | -.776 | -.227 | .104 |
| 06 JUL 66 N EASTER I | 5457.40 | 178.30 | .078 | .448 | .618 | -.422 | -.169 | .445 | .428 | -.687 | -.179 | .108 |
| 02 SEP66 N EASTER CD | 5467.03 | 179.59 | .137 | .597 | .691 | -.433 | -.187 | .246 | .544 | -.694 | -.198 | -.029 |
| AVERAGE | | | .107 | .556 | .654 | -.454 | -.190 | .350 | .577 | -.692 | -.201 | .102 |
| SIGMA | | | .039 | .076 | .057 | .046 | .033 | .047 | .051 | .058 | .020 | .104 |
| N | | | 4 | 4 | 4 | 3 | 4 | 4 | 3 | 4 | 4 | 4 |

## EVENT PARAMETERS

| 4 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 21 JUL66 ESTR-GALUP | -3.900 | -104.300 | 33 | 05 32 18.2 | .0499 | .028 | 18 |
| 20 JUN 66 N EASTER I | -4.000 | -104.200 | 33 | 09 38 16.0 | .0510 | .039 | 20 |
| 06 JUL 66 N EASTER I | -4.400 | -104.900 | 33 | 19 23 34.0 | .0474 | .014 | 18 |
| 02 SEP66 N EASTER CD | -4.500 | -105.900 | 33 | 07 59 05.7 | .0499 | .001 | 20 |

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# RELATIVE TRAVEL-TIME ANOMALIES

HERRIN(1968)TRAVEL-TIME TABLES — REFERENCE STATION AO

INCLUDING ELLIPTICITY

ANOMALY REGION = NORTHWEST OF EASTER I.
DISTANCE RANGE = 7650 TO 7809 KM AZIMUTH RANGE = 187.4 TO 188.8 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 06 NOV65 EASTER I | 7650.45 | 187.54 | 0 | 0 | 0 | 0 | .102 | -.132 | -.145 | -.034 | .123 | -.171 |
| 09 NOV65 EASTER I | 7671.48 | 187.42 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -.105 | .128 | 0 |
| 05 NOV65 EASTER I | 7673.48 | 187.62 | 0 | 0 | 0 | 0 | 0 | 0 | -.146 | -.023 | 0 | -.245 |
| 08 NOV 66 EASTER IS | 7808.70 | 188.76 | -.010 | -.103 | -.030 | .172 | .305 | -.111 | -.107 | .104 | .197 | -.122 |
| | AVERAGE | | -.010 | -.103 | -.030 | .172 | .244 | -.121 | -.133 | -.015 | .136 | -.179 |
| | SIGMA | | 0 | 0 | 0 | 0 | .087 | .015 | .022 | .087 | .010 | .002 |
| | N | | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 4 | 3 | 3 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 06 NOV65 EASTER I | 7650.45 | 187.54 | -.324 | .162 | .496 | -.325 | -.164 | .097 | .449 | -.079 | -.154 | 0 |
| 09 NOV65 EASTER I | 7671.48 | 187.42 | -.298 | .223 | .503 | -.268 | -.142 | .121 | 0 | -.101 | -.092 | .021 |
| 05 NOV65 EASTER I | 7673.48 | 187.62 | 0 | 0 | .413 | 0 | -.062 | .141 | .546 | -.105 | -.252 | -.055 |
| 08 NOV 66 EASTER IS | 7808.70 | 188.76 | -.172 | .548 | .514 | -.325 | -.124 | .242 | 0 | -.178 | -.123 | .033 |
| | AVERAGE | | -.265 | .311 | .502 | -.306 | -.123 | .160 | .497 | -.114 | -.155 | -.000 |
| | SIGMA | | .002 | .208 | .070 | .033 | .044 | .083 | .069 | .043 | .069 | .048 |
| | N | | 3 | 3 | 4 | 3 | 4 | 4 | 2 | 4 | 4 | 3 |

## EVENT PARAMETERS

| EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 06 NOV65 EASTER I | -24.100 | -113.000 | 33 | 09 21 40.6 | .0536 | -.030 | 15 |
| 09 NOV65 EASTER I | -24.300 | -113.700 | 33 | 21 59 04.3 | .0564 | -.005 | 11 |
| 05 NOV65 EASTER I | -22.300 | -113.900 | 33 | 10 03 27.0 | .0591 | -.023 | 10 |
| 08 NOV 66 EASTER IS | -23.400 | -115.200 | 33 | 03 19 17.0 | .0777 | .039 | 19 |

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# RELATIVE TRAVEL-TIME ANOMALIES

HERRIN68 TRAVEL-TIME TABLES — REFERENCE STATION A0

INCLUDING ELLIPTICITY

ANOMALY REGION = SOUTH AND WEST OF EASTER I.
DISTANCE RANGE = 8108 TO 9075 KM AZIMUTH RANGE = 179.8 TO 187.7 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 08 APR66 EASTER | 8108.10 | 187.68 | 0 | -.118 | -.016 | 0 | .225 | -.074 | 0 | .069 | .181 | -.099 |
| 09 APR66 EASTER | 8243.67 | 186.81 | .040 | 0 | -.085 | .171 | .284 | -.041 | -.135 | .142 | .186 | -.207 |
| 06 SEP 66 EASTER IS | 8442.7V | 185.47 | -.020 | -.078 | .022 | .238 | .350 | -.001 | -.100 | .182 | .257 | -.138 |
| 2A NOV65 EASTER I. | 852V.8A | 187.55 | .028 | -.05[illegible] | .013 | .317 | .360 | -.052 | -.046 | .116 | .184 | -.222 |
| 29 NOV65 EASTER I | 8760.63 | 182.39 | .032 | -.127 | -.025 | 0 | 0 | -.110 | -.120 | .089 | .161 | -.301 |
| 24 MAR66 EASTER | 8824.04 | 182.37 | .025 | -.059 | -.066 | 0 | .209 | -.100 | -.135 | .220 | 0 | 0 |
| 16 MAY 67 EASTER IS | 8844.51 | 181.86 | -.070 | -.177 | -.110 | -.153 | .294 | -.123 | -.068 | .106 | .111 | -.153 |
| 05 APR66 EASTER | 9020.00 | 182.90 | .030 | -.098 | .063 | .295 | .328 | 0 | -.131 | .221 | .100 | 0 |
| 09 FEB 66 E IS COND | 9074.76 | 179.82 | .037 | -.088 | .093 | .263 | .350 | -.048 | -.069 | .213 | .089 | -.234 |
| | AVERAGE | | .013 | -.100 | -.017 | .239 | .300 | -.068 | -.101 | .151 | .159 | -.194 |
| | SIGMA | | .038 | .041 | .061 | .066 | .058 | .041 | .035 | .080 | .056 | .068 |
| | N | | 8 | 8 | 9 | 6 | 8 | 8 | 8 | 9 | 8 | 7 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 08 APR66 EASTER | 8108.10 | 187.68 | -.216 | .364 | .570 | -.294 | -.158 | .219 | .935 | 0 | -.606 | -.017 |
| 09 APR66 EASTER | 8243.67 | 186.81 | -.195 | .403 | .548 | -.297 | -.249 | .118 | .617 | -.233 | -.408 | .030 |
| 06 SEP 66 EASTER IS | 8442.7V | 185.47 | -.177 | 0 | .678 | -.308 | 0 | .306 | 0 | -.192 | -.446 | -.089 |
| 2A NOV65 EASTER I. | 852V.8A | 187.55 | -.193 | .388 | .695 | -.380 | -.319 | .197 | .799 | -.378 | -.603 | 0 |
| 29 NOV65 EASTER I | 8760.63 | 182.39 | -.182 | .364 | .514 | -.376 | -.298 | 0 | .426 | 0 | -.605 | 0 |
| 24 MAR66 EASTER | 8824.04 | 182.37 | -.278 | .464 | .474 | -.341 | -.160 | .063 | 0 | -.348 | -.725 | -.039 |
| 16 MAY 67 EASTER IS | 8844.51 | 181.86 | -.079 | .472 | .325 | -.263 | -.191 | .300 | 0 | -.182 | -.805 | -.174 |
| 05 APR66 EASTER | 9020.00 | 182.90 | -.141 | 0 | .427 | -.440 | -.194 | .214 | 0 | -.381 | -.482 | -.089 |
| 09 FEB 66 E IS COND | 9074.76 | 179.82 | -.065 | .471 | .472 | -.426 | -.261 | .251 | .264 | -.374 | -.564 | -.081 |
| | AVERAGE | | -.165 | .418 | .523 | -.343 | -.219 | .203 | .520 | -.298 | -.582 | -.065 |
| | SIGMA | | .066 | .049 | .117 | .067 | .062 | .086 | .188 | .092 | .128 | .065 |
| | N | | 9 | 7 | 9 | 9 | 8 | 8 | 5 | 7 | 6 | 7 |

## EVENT PARAMETERS

| 9 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 08 APR66 EASTER | -26.200 | -114.400 | 33 | 14 07 53.9 | .0545 | .006 | 16 |
| 09 APR66 EASTER | -27.500 | -113.600 | 33 | 04 07 52.0 | .0657 | .013 | 19 |
| 06 SEP 66 EASTER IS | -29.400 | -112.300 | 33 | 20 25 06.0 | .0790 | .049 | 17 |
| 24 NOV65 EASTER I. | -30.000 | -114.700 | 33 | 03 12 43.0 | .0844 | .018 | 19 |
| 29 NOV65 EASTER I | -32.500 | -109.000 | 33 | 18 50 31.0 | .0492 | -.034 | 15 |
| 24 MAR66 EASTER | -33.000 | -109.000 | 33 | 07 24 52.0 | .0747 | -.028 | 16 |
| 16 MAY 67 EASTER IS | -33.200 | -108.400 | 33 | 08 14 34.0 | .1010 | -.024 | 19 |
| 05 APR66 EASTER | -34.000 | -109.700 | 33 | 18 34 53.0 | .0617 | .002 | 16 |
| 09 FEB 66 E IS COND | -35.300 | -106.000 | 33 | 13 57 48.7 | .0791 | -.006 | 20 |

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# RELATIVE TRAVEL-TIME ANOMALIES

HERRIN66TRAVEL-TIME TABLES

INCLUDING ELLIPTICITY REFERENCE STATION A0

ANOMALY REGION = W CHILE RISE = 1

DISTANCE RANGE = 8969 TO 9490 KM AZIMUTH RANGE = 170.1 TO 177.5 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22 JUN 66 W CHILE R | 8968.93 | 177.46 | .043 | -.095 | -.049 | .245 | .154 | | | | | |
| 03 MAR 67 W CHILE R | 9034.07 | 174.32 | .013 | -.117 | .020 | .176 | .143 | 0 | -.036 | .217 | .008 | -.219 |
| 18 NOV 66 S PACIFIC | 9202.27 | 175.51 | .010 | -.118 | .055 | .197 | .203 | -.065 | -.159 | .200 | .174 | 0 |
| 22 FEB 67 W CHILE R | 9273.04 | 172.79 | -.024 | -.093 | .017 | .160 | .101 | 0 | -.070 | .258 | .075 | 0 |
| 25 FEB 66 S PACIFIC | 9349.39 | 171.25 | .003 | -.102 | .016 | .135 | .262 | -.232 | -.004 | .257 | .061 | -.209 |
| 18 JUL 66 W CHILE R | 9490.09 | 170.14 | -.063 | -.036 | .087 | .223 | .225 | 0 | -.116 | .268 | .007 | -.245 |
| | | | | | | | | -.216 | -.071 | .285 | .11 | 0 |
| | AVERAGE | | -.005 | -.107 | .024 | .189 | .208 | -.171 | -.076 | .261 | .087 | -.251 |
| | SIGMA | | .038 | .048 | .046 | .041 | .058 | .092 | .055 | .024 | .04 | .035 |
| | N | | 6 | 6 | 6 | 6 | 6 | 3 | 6 | 6 | 6 | 3 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22 JUN 66 W CHILE R | 8968.93 | 177.46 | -.085 | .409 | .314 | -.474 | -.162 | .211 | -.033 | -.337 | -.449 | -.249 |
| 03 MAR 67 W CHILE R | 9034.07 | 174.32 | .033 | .494 | .417 | 0 | -.100 | .178 | 0 | -.308 | 0 | -.260 |
| 18 NOV 66 S PACIFIC | 9202.27 | 175.51 | -.000 | .417 | .371 | 0 | -.172 | .304 | .094 | 0 | -.518 | -.123 |
| 22 FEB 67 W CHILE R | 9273.04 | 172.79 | -.004 | .443 | .377 | -.578 | -.215 | .248 | 0 | -.606 | -.590 | -.166 |
| 25 FEB 66 S PACIFIC | 9349.39 | 171.25 | .042 | .400 | .231 | -.526 | -.100 | .295 | -.019 | -.495 | -.426 | -.138 |
| 18 JUL 66 W CHILE R | 9490.09 | 170.14 | .121 | .522 | 0 | -.571 | -.054 | .456 | 0 | -.424 | -.193 | -.083 |
| | AVERAGE | | .018 | .447 | .342 | -.537 | -.147 | .249 | .014 | -.434 | -.435 | -.170 |
| | SIGMA | | .068 | .050 | .072 | .048 | .059 | .097 | .070 | .121 | .150 | .071 |
| | N | | 6 | 6 | 5 | 4 | 6 | 6 | 3 | 5 | 5 | 6 |

## EVENT PARAMETERS

| 6 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | ND. STA |
|---|---|---|---|---|---|---|---|
| 22 JUN 66 W CHILE R | -34.300 | -103.200 | 33 | 5 51 53.0 | .0575 | -.012 | 19 |
| 03 MAR 67 W CHILE R | -34.700 | -99.400 | 33 | 3 01 36.6 | .0713 | .005 | 16 |
| 18 NOV 66 S PACIFIC | -36.300 | -100.700 | 33 | 9 12 09.9 | .0412 | .038 | 16 |
| 22 FEB 67 W CHILE R | -36.700 | -97.300 | 33 | 3 51 15.0 | .0646 | -.029 | 19 |
| 25 FEB 66 S PACIFIC | -37.200 | -99.300 | 33 | 2 45 11.0 | .0503 | .017 | 19 |
| 18 JUL 66 W CHILE R | -38.300 | -93.700 | 33 | 2 15 38.0 | .0932 | .053 | 17 |

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# RELATIVE TRAVEL-TIME ANOMALIES

HERRIN(68) TRAVEL-TIME TABLES — INCLUDING ELLIPTICITY — REFERENCE STATION AO

ANOMALY REGION = WEST CHILE RISE = 2
DISTANCE RANGE = 9925 TO 10057 KM AZIMUTH RANGE = 163.4 TO 166.6 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 06 APR 67 W CHILE R | 9924.77 | 166.56 | -.152 | -.180 | -.007 | 0 | .132 | -.205 | -.108 | .232 | .008 | -.232 |
| 06 DEC 66 W CHILE R | 10057.27 | 163.38 | -.063 | -.107 | -.036 | -.128 | .276 | -.123 | -.087 | .353 | -.049 | -.281 |
| AVERAGE | | | -.108 | -.144 | -.022 | -.128 | .204 | -.164 | -.097 | .292 | -.031 | -.257 |
| SIGMA | | | .063 | .052 | .021 | 0 | .101 | .058 | .015 | .085 | .055 | .035 |
| N | | | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | F4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 06 APR 67 W CHILE R | 9924.77 | 166.56 | .088 | .373 | .292 | 0 | 0 | .447 | 0 | 0 | 0 | -.243 |
| 06 DEC 66 W CHILE R | 10057.27 | 163.38 | .099 | .265 | .138 | -.453 | .094 | .382 | -.120 | -.179 | .150 | -.403 |
| AVERAGE | | | .093 | .319 | .215 | -.453 | .094 | .415 | -.120 | -.179 | .150 | -.323 |
| SIGMA | | | .008 | .076 | .108 | 0 | 0 | .046 | 0 | 0 | 0 | .113 |
| N | | | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 2 |

## EVENT PARAMETERS

| 2 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 06 APR 67 W CHILE R | -41.500 | -88.200 | 33 | 1 52 03.0 | .0500 | .004 | 14 |
| 06 DEC 66 W CHILE R | -41.900 | -83.700 | 33 | 05 25 07.2 | .0413 | -.003 | 20 |

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# RELATIVE TRAVEL-TIME ANOMALIES

MERRIAM TRAVEL-TIME TABLES

INCLUDING ELLIPTICITY

REFERENCE STATION 40

ANOMALY REGION = SAMOA - TONGA IS. REGION
DISTANCE RANGE = 9565 TO 10446 KM AZIMUTH RANGE = 238.8 TO 244.2 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 MAR66 SAMOA | 9565.29 | 243.40 | -.001 | -.183 | -.050 | .090 | .029 | -.301 | -.189 | .125 | -.076 | -.207 |
| 01 JAN 67 TONGA IS | 9590.86 | 243.21 | -.149 | -.312 | -.122 | .029 | -.051 | -.318 | -.208 | -.017 | -.083 | 0 |
| 12 MAR66 TONGA | 9584.13 | 242.51 | .009 | -.228 | -.601 | .105 | .042 | -.363 | -.152 | .118 | 0 | -.249 |
| 20 NOV65 TONGA IS | 9661.03 | 243.82 | 0 | 0 | 0 | 0 | 0 | 0 | -.135 | .075 | -.112 | -.423 |
| 05 JUL66 TONGA | 9671.59 | 244.24 | .052 | -.226 | -.068 | .108 | .069 | -.294 | -.162 | .074 | 6 | -.409 |
| 02 JAN66 TONGA IS. | 9684.62 | 243.14 | 0 | 0 | 0 | .101 | 0 | 0 | -.242 | .108 | -.026 | -.428 |
| 26 DEC65 TONGA IS. | 9759.62 | 243.33 | 0 | 0 | 0 | .143 | .057 | -.272 | -.148 | .064 | -.047 | -.379 |
| 20 MAR66 TONGA-1 | 9796.93 | 242.80 | -.107 | -.338 | -.120 | .090 | -.010 | -.410 | -.243 | .151 | -.092 | -.359 |
| 11 AUG 66 TONGA IS | 9952.22 | 240.90 | .006 | -.197 | -.025 | .139 | .110 | -.201 | -.242 | .164 | .007 | -.361 |
| 08 JUL66 TONGA | 9966.93 | 241.52 | -.052 | -.210 | -.094 | .103 | .067 | -.305 | -.197 | .118 | -.029 | -.423 |
| 04 MAR 67 TONGA IS | 9985.34 | 242.50 | -.016 | -.225 | -.036 | .080 | .089 | -.248 | -.217 | .093 | -.006 | -.370 |
| 29 MAR66 TONGA | 10105.61 | 241.47 | -.045 | -.238 | 0 | .087 | .034 | -.336 | -.280 | .035 | -.066 | -.405 |
| 20 MAR66 TONGA-2 | 10136.99 | 240.25 | -.079 | -.294 | -.053 | .074 | .009 | 0 | -.166 | .120 | -.101 | -.310 |
| 16 MAR66 TONGA | 10140.74 | 239.98 | -.071 | -.242 | -.012 | 0 | -.024 | -.321 | -.272 | .100 | -.101 | -.465 |
| 21 MAY66 TONGA IS | 10181.84 | 240.89 | 0 | -.248 | -.061 | .097 | .083 | -.328 | -.188 | .077 | .000 | -.333 |
| 13 MAR66 TONGA | 10186.53 | 240.96 | -.100 | -.198 | -.161 | .078 | -.086 | -.358 | -.259 | .028 | -.097 | 0 |
| 01 JUN66 TONGA IS | 10367.27 | 230.00 | -.655 | -.277 | -.057 | .067 | .046 | -.357 | -.279 | .108 | -.086 | 0 |
| 27 JUN66 TONGA | 10367.41 | 240.89 | -.097 | -.304 | -.077 | .071 | .002 | -.359 | -.208 | .055 | -.127 | -.409 |
| 27 FEB 67 TONGA IS | 10435.87 | 238.97 | -.073 | -.237 | -.120 | .045 | -.064 | -.385 | -.212 | .074 | -.139 | -.476 |
| 07 APR 66 TONGA IS | 10446.25 | 238.77 | -.022 | -.306 | -.061 | .644 | .161 | -.321 | -.132 | .121 | -.607 | -.361 |
| | AVERAGE | | -.050 | -.251 | -.070 | .087 | .031 | -.322 | -.207 | .090 | -.068 | -.379 |
| | SIGMA | | .052 | .046 | .044 | .031 | .063 | .051 | .048 | .043 | .046 | .081 |
| | N | | 16 | 17 | 16 | 16 | 18 | 17 | 20 | 20 | 18 | 17 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 MAR66 SAMOA | 9565.29 | 243.40 | 0 | -.177 | -.252 | -.512 | -.408 | .063 | -.071 | -.769 | -.276 | -.649 |
| 01 JAN 67 TONGA IS | 9590.86 | 243.21 | -.141 | -.031 | -.244 | -.519 | -.325 | .063 | -.173 | -.803 | -.144 | -.704 |
| 12 MAR66 TONGA | 9584.13 | 242.51 | 0 | -.197 | -.307 | -.525 | -.397 | .052 | -.163 | -.728 | -.216 | -.776 |
| 20 NOV65 TONGA IS | 9661.03 | 243.82 | -.131 | 0 | 0 | 0 | 0 | .037 | -.216 | -.676 | 0 | -.833 |
| 05 JUL66 TONGA | 9671.59 | 244.24 | -.134 | 0 | -.274 | 0 | -.432 | .008 | -.110 | -.772 | 0 | -.719 |
| 02 JAN66 TONGA IS. | 9684.62 | 243.14 | -.175 | -.191 | -.275 | -.507 | -.523 | .045 | -.096 | -.789 | -.291 | -.676 |
| 26 DEC65 TONGA IS. | 9759.62 | 243.33 | -.202 | -.216 | -.378 | -.544 | 0 | .129 | -.111 | -.796 | -.340 | -.859 |
| 20 MAR66 TONGA-1 | 9796.93 | 242.86 | -.216 | -.218 | -.239 | -.472 | -.598 | .034 | -.109 | -.807 | -.409 | -.776 |
| 11 AUG 66 TONGA IS | 9952.22 | 240.90 | -.[illegible] | -.020 | -.240 | -.403 | -.385 | .060 | .082 | -.667 | -.318 | -.657 |
| 08 JUL66 TONGA | 9966.93 | 241.52 | -.163 | -.136 | -.268 | -.527 | -.507 | .104 | .090 | -.754 | -.345 | -.712 |
| 04 MAR 67 TONGA IS | 9985.34 | 242.50 | -.154 | -.123 | -.244 | 0 | -.483 | .016 | -.047 | -.745 | -.364 | -.765 |
| 29 MAR66 TONGA | 10105.61 | 241.47 | -.296 | -.183 | -.209 | -.457 | -.544 | .019 | -.025 | -.736 | 0 | -.721 |
| 20 MAR66 TONGA-2 | 10136.99 | 240.25 | -.176 | -.156 | -.201 | -.512 | -.511 | .014 | -.158 | -.699 | -.434 | -.681 |
| 16 MAR66 TONGA | 10140.74 | 239.98 | -.213 | -.192 | -.288 | -.567 | -.574 | .093 | -.151 | -.708 | -.382 | -.739 |
| 21 MAY66 TONGA IS | 10181.84 | 240.89 | -.121 | -.122 | -.141 | -.420 | -.441 | .164 | -.145 | -.629 | -.200 | -.622 |
| 13 MAR66 TONGA | 10186.53 | 240.96 | 0 | -.120 | -.235 | -.610 | -.440 | .029 | -.682 | -.834 | -.398 | -.767 |
| 01 JUN66 TONGA IS | 10367.27 | 230.00 | -.173 | -.153 | -.266 | -.606 | -.525 | .086 | -.200 | -.679 | -.400 | 0 |
| 27 JUN66 TONGA | 10367.41 | 240.89 | -.166 | -.162 | -.323 | -.573 | -.466 | .065 | -.273 | -.719 | -.220 | -.736 |
| 27 FEB 67 TONGA IS | 10435.87 | 238.97 | -.086 | -.196 | -.259 | -.552 | -.513 | .178 | .065 | -.739 | -.083 | -.819 |
| 07 APR 66 TONGA IS | 10446.25 | 238.77 | -.119 | -.110 | -.251 | -.440 | -.390 | .188 | .166 | -.613 | -.018 | -.734 |
| | AVERAGE | | -.161 | -.150 | -.258 | -.519 | -.470 | .026 | -.086 | -.733 | -.284 | -.730 |
| | SIGMA | | .055 | .056 | .049 | .063 | .073 | .089 | .113 | .088 | .121 | .062 |
| | N | | 17 | 18 | 19 | 17 | 18 | 20 | 20 | 20 | 17 | 19 |

## EVENT PARAMETERS

| 20 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 12 MAR66 SAMOA | -15.000 | -173.600 | 85 | 14 19 38.0 | .0424 | .024 | 19 |
| 01 JAN 67 TONGA IS | -15.300 | -173.600 | 33 | 01 05 48.6 | .0782 | -.005 | 19 |
| 12 MAR66 TONGA | -15.706 | -173.000 | 83 | 14 26 57.6 | .0594 | .011 | 10 |
| 20 NOV65 TONGA IS | -15.400 | -174.500 | 82 | 03 47 52.4 | .0748 | -.027 | 9 |
| 05 JUL66 TONGA | -15.200 | -174.900 | 292 | 03 22 45.2 | .0387 | .011 | 16 |
| 02 JAN66 TONGA IS. | -16.000 | -174.100 | 181 | 03 33 56.4 | .0446 | -.018 | 15 |
| 26 DEC65 TONGA IS. | -16.400 | -174.700 | 380 | 16 44 44.0 | .0719 | -.033 | 16 |
| 20 MAR66 TONGA-1 | -17.000 | -174.500 | 187 | 07 47 50.2 | .0660 | .041 | 20 |
| 11 AUG 66 TONGA IS | -19.300 | -173.900 | 83 | 05 12 42.2 | .0835 | .065 | 20 |
| 08 JUL66 TONGA | -19.000 | -174.500 | 5 | 22 12 23.2 | .0574 | .003 | 20 |
| 04 MAR 67 TONGA IS | -18.500 | -175.400 | 225 | 06 16 21.9 | .0370 | .015 | 19 |
| 29 MAR66 TONGA | -20.000 | -175.300 | 95 | 10 42 15.1 | .0526 | -.014 | 18 |
| 20 MAR66 TONGA-2 | -21.006 | -174.500 | 95 | 09 04 31.8 | .0528 | -.008 | 19 |
| 16 MAR66 TONGA | -21.200 | -174.300 | 66 | 12 13 02.4 | .0563 | -.028 | 19 |
| 21 MAY66 TONGA IS | -20.900 | -175.300 | 75 | 10 58 59.8 | .0703 | .046 | 19 |
| 13 MAR66 TONGA | -26.900 | -175.400 | 65 | 18 40 40.7 | .0660 | -.039 | 18 |
| 01 JUN66 TONGA IS | -23.406 | -174.900 | 24 | 11 47 33.1 | .0551 | -.023 | 18 |
| 27 JUN66 TONGA | -22.700 | -175.800 | 60 | 08 38 45.8 | .0569 | -.026 | 20 |
| 27 FEB 67 TONGA IS | -23.900 | -175.300 | 33 | 11 13 02.0 | .0851 | -.004 | 20 |
| 07 APR 66 TONGA IS | -24.100 | -175.200 | 33 | 14 36 29.0 | .1086 | .065 | 20 |

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# RELATIVE TRAVEL-TIME ANOMALIES

HERRIN66TRAVEL-TIME TABLES — REFERENCE STATION A0

INCLUDING ELLIPTICITY

ANOMALY REGION = FIJI IS.
DISTANCE RANGE = 9910 TO 10869 KM AZIMUTH RANGE = 238.0 TO 247.4 DEGREES

| | EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 19 | JAN 67 FIGI IS | 9910.27 | 247.37 | -.087 | -.243 | -.081 | -.040 | -.026 | -.337 | -.321 | -.058 | -.101 | -.465 |
| 09 | DEC65 FIJI IS.-1 | 10135.38 | 244.84 | 0 | 0 | 0 | -.005 | .030 | -.252 | -.197 | -.022 | -.043 | -.403 |
| 09 | DEC65 FIJI IS.-2 | 10117.25 | 245.11 | 0 | 0 | 0 | .059 | 0 | -.270 | -.158 | 0 | -.065 | 0 |
| 20 | FEB66 FIJI IS | 10147.84 | 245.13 | -.112 | -.201 | -.052 | .005 | -.128 | 0 | -.214 | -.054 | -.106 | -.363 |
| 28 | JAN66 FIJI IS | 10147.84 | 245.13 | -.053 | -.101 | -.052 | .025 | .022 | -.285 | -.173 | .084 | 0 | -.423 |
| 27 | JAN66 FIJI IS. | 10154.78 | 245.20 | -.013 | -.171 | -.102 | .045 | -.108 | -.316 | -.194 | .127 | -.146 | -.425 |
| 29 | SEP66 FIJI IS | 10157.89 | 242.18 | -.066 | -.265 | -.075 | .064 | -.055 | -.2 5 | -.183 | .052 | -.104 | -.390 |
| 10 | MAR66 FIJI | 10161.77 | 243.14 | -.089 | -.300 | -.088 | -.031 | -.040 | -.356 | -.184 | .036 | -.196 | -.417 |
| 24 | MAR66 FIJI | 10172.89 | 239.86 | -.116 | -.391 | -.165 | -.008 | -.069 | -.315 | -.304 | .036 | -.157 | 0 |
| 18 | NOV65 FIJI IS | 10181.56 | 244.11 | 0 | 0 | 0 | 0 | 0 | 0 | -.261 | -.020 | .066 | -.454 |
| 21 | DEC65 FIJI IS. | 10186.06 | 243.70 | 0 | 0 | 0 | .202 | 0 | -.241 | -.150 | .076 | 0 | -.322 |
| 25 | DEC65 FIJI IS.-4 | 10204.87 | 245.56 | 0 | 0 | 0 | -.108 | -.020 | -.334 | -.147 | .109 | -.013 | -.420 |
| 25 | DEC65 FIJI IS.-6 | 10206.23 | 245.43 | 0 | 0 | 0 | -.157 | -.022 | -.234 | -.096 | .078 | -.082 | -.418 |
| 19 | DEC65 FIJI IS. | 10211.84 | 245.63 | 0 | 0 | 0 | -.089 | -.019 | -.254 | -.198 | -.011 | -.069 | -.411 |
| 25 | DEC65 FIJI IS.-5 | 10213.19 | 245.50 | 0 | 0 | 0 | 0 | -.090 | -.303 | -.117 | 0 | 0 | -.389 |
| 26 | MAY66 FIJI | 10314.65 | 241.84 | 0 | -.250 | -.069 | .050 | .005 | -.334 | -.254 | .016 | -.030 | -.370 |
| 17 | JAN66 FIJI IS. | 10389.84 | 243.23 | -.109 | -.363 | -.096 | 0 | 0 | -.398 | -.193 | .009 | 0 | -.437 |
| 16 | APR66 FIJI | 10421.68 | 243.10 | -.155 | -.261 | -.073 | .060 | -.057 | -.362 | -.209 | .031 | -.127 | -.359 |
| 08 | FEB66 FIJI IS. | 10423.20 | 242.97 | -.078 | -.220 | -.061 | .038 | -.011 | -.324 | -.156 | .082 | -.129 | -.418 |
| 17 | MAR66 FIJI | 10462.72 | 243.53 | .086 | -.328 | -.054 | 0 | .035 | -.299 | -.072 | .052 | 0 | -.286 |
| 13 | APR66 SO FIJI IS | 10717.71 | 242.36 | -.049 | -.261 | -.007 | -.086 | .006 | -.261 | -.176 | .051 | .003 | -.404 |
| 24 | JUN 66 FIGI IS | 10802.26 | 238.53 | -.109 | -.243 | -.094 | .067 | .034 | -.343 | -.213 | .128 | .038 | -.482 |
| 26 | AUG66 KERMADEC IS | 10869.08 | 238.00 | -.020 | -.248 | .003 | .124 | .174 | -.233 | -.174 | .074 | -.031 | -.364 |
| | | AVERAGE | | -.069 | -.262 | -.077 | .056 | -.019 | -.302 | -.189 | .047 | -.073 | -.401 |
| | | SIGMA | | .059 | .061 | .036 | .067 | .067 | .046 | .059 | .050 | .071 | .046 |
| | | N | | 14 | 15 | 15 | 19 | 19 | 21 | 23 | 21 | 18 | 21 |

| | EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 19 | JAN 67 FIGI IS | 9910.27 | 247.37 | -.251 | -.253 | -.328 | -.484 | -.290 | .016 | -.134 | -.582 | -.306 | -.781 |
| 09 | DEC65 FIJI IS.-1 | 10135.38 | 244.84 | -.190 | -.280 | 0 | -.547 | -.402 | -.074 | -.167 | -.590 | -.352 | -.673 |
| 09 | DEC65 FIJI IS.-2 | 10117.25 | 245.11 | -.163 | -.273 | -.304 | -.548 | -.525 | -.143 | -.163 | -.685 | -.285 | -.703 |
| 20 | FEB66 FIJI IS | 10147.84 | 245.13 | -.168 | 0 | -.457 | -.587 | -.423 | -.156 | -.347 | -.683 | -.355 | -.842 |
| 28 | JAN66 FIJI IS | 10147.84 | 245.13 | 0 | -.184 | -.388 | -.547 | -.412 | -.053 | -.197 | -.683 | -.337 | -.772 |
| 27 | JAN66 FIJI IS. | 10154.78 | 245.20 | -.217 | -.183 | -.326 | -.520 | -.467 | -.112 | -.178 | -.769 | -.322 | -.777 |
| 29 | SEP66 FIJI IS | 10157.89 | 242.18 | -.150 | -.234 | -.331 | 0 | -.486 | -.004 | -.159 | -.684 | -.165 | -.742 |
| 10 | MAR66 FIJI | 10161.77 | 243.14 | 0 | -.241 | -.343 | -.556 | 0 | -.015 | -.181 | -.664 | -.079 | -.736 |
| 24 | MAR66 FIJI | 10172.89 | 239.86 | -.109 | -.244 | -.364 | -.560 | -.519 | -.028 | -.301 | -.627 | -.242 | -.709 |
| 18 | NOV65 FIJI IS | 10181.56 | 244.11 | -.290 | 0 | 0 | 0 | -.378 | -.230 | 0 | -.627 | -.262 | -.800 |
| 21 | DEC65 FIJI IS. | 10186.06 | 243.70 | -.114 | 0 | -.183 | -.471 | -.480 | -.026 | -.192 | -.540 | -.152 | -.724 |
| 25 | DEC65 FIJI IS.-4 | 10204.87 | 245.56 | -.116 | -.164 | -.334 | -.557 | -.424 | .060 | .058 | -.761 | -.238 | -.740 |
| 25 | DEC65 FIJI IS.-6 | 10206.23 | 245.43 | -.113 | 0 | 0 | 0 | 0 | -.039 | -.010 | -.601 | -.118 | 0 |
| 19 | DEC65 FIJI IS. | 10211.84 | 245.63 | -.155 | -.333 | -.368 | -.563 | 0 | -.024 | -.115 | 0 | 0 | -.704 |
| 25 | DEC65 FIJI IS.-5 | 10213.19 | 245.50 | -.134 | 0 | -.200 | -.556 | -.439 | -.007 | -.096 | -.724 | -.274 | -.714 |
| 26 | MAY66 FIJI | 10314.65 | 241.84 | -.201 | -.284 | -.247 | -.502 | -.496 | .012 | 0 | -.659 | -.245 | -.746 |
| 17 | JAN66 FIJI IS. | 10389.84 | 243.23 | -.105 | -.271 | -.376 | -.728 | 0 | .072 | -.282 | -.760 | -.046 | -.609 |
| 16 | APR66 FIJI | 10421.68 | 243.10 | -.144 | -.242 | -.363 | -.585 | -.406 | .063 | -.139 | -.714 | -.861 | -.750 |
| 08 | FEB66 FIJI IS. | 10423.20 | 242.97 | -.147 | -.216 | -.358 | -.568 | -.340 | .124 | -.044 | -.678 | .046 | -.717 |
| 17 | MAR66 FIJI | 10462.72 | 243.53 | -.093 | 0 | -.115 | -.300 | -.268 | .210 | .172 | -.754 | .086 | 0 |
| 13 | APR66 SO FIJI IS | 10717.71 | 242.36 | -.186 | 0 | -.227 | -.334 | -.544 | .001 | -.830 | -.622 | -.023 | -.710 |
| 24 | JUN 66 FIGI IS | 10802.26 | 238.53 | -.079 | -.120 | -.330 | -.622 | -.472 | .055 | -.146 | -.867 | -.209 | -.347 |
| 26 | AUG66 KERMADEC IS | 10869.08 | 238.00 | -.142 | -.018 | -.057 | -.313 | -.485 | .069 | 0 | -.590 | -.373 | -.694 |
| | | AVERAGE | | -.160 | -.216 | -.304 | -.522 | -.436 | -.009 | -.133 | -.647 | -.197 | -.751 |
| | | SIGMA | | .053 | .081 | .096 | .104 | .075 | .096 | .122 | .064 | .132 | .056 |
| | | N | | 21 | 16 | 20 | 20 | 19 | 23 | 20 | 22 | 22 | 21 |

## EVENT PARAMETERS

| | 23 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|---|
| 10 | JAN 67 FIGI IS | -14.800 | -178.800 | 18 | 12 40 12.6 | .0710 | -.024 | 20 |
| 09 | DEC65 FIJI IS.-1 | -18.000 | -178.200 | 650 | 13 12 55.5 | .0722 | -.027 | 16 |
| 09 | DEC65 FIJI IS.-2 | -17.700 | -178.300 | 650 | 13 25 40.7 | .0578 | -.023 | 14 |
| 20 | FEB66 FIJI IS | -17.900 | -178.500 | 583 | 06 11 54.4 | .0040 | -.054 | 18 |
| 28 | JAN66 FIJI IS | -17.900 | -178.500 | 570 | 00 27 34.3 | .0526 | -.009 | 18 |
| 27 | JAN66 FIJI IS. | -17.900 | -178.600 | 600 | 02 01 34.7 | .0600 | -.021 | 20 |
| 29 | SEP66 FIJI IS | -19.900 | -176.200 | 244 | 02 44 10.0 | .0214 | -.006 | 19 |
| 10 | MAR66 FIJI | -19.300 | -177.000 | 320 | 12 15 19.4 | .0503 | -.018 | 18 |
| 24 | MAR66 FIJI | -21.500 | -174.400 | 101 | 04 04 55.5 | .0757 | -.057 | 10 |
| 18 | NOV65 FIJI IS | -18.000 | -177.900 | 421 | 20 00 19.0 | .1190 | -.052 | 10 |
| 21 | DEC65 FIJI IS. | -19.100 | -177.600 | 366 | 17 50 10.2 | .0772 | .046 | 14 |
| 25 | DEC65 FIJI IS.-4 | -18.000 | -178.200 | 625 | 02 57 57.0 | .0646 | -.021 | 17 |
| 25 | DEC65 FIJI IS.-6 | -18.100 | -178.100 | 620 | 20 46 43.6 | .0732 | .047 | 12 |
| 19 | DEC65 FIJI IS. | -18.000 | -178.300 | 620 | 02 21 27.0 | .0471 | -.011 | 14 |
| 25 | DEC65 FIJI IS.-5 | -18.100 | -178.200 | 620 | 10 20 45.1 | .0452 | -.004 | 13 |
| 26 | MAY66 FIJI | -21.200 | -176.900 | 238 | 18 30 07.4 | .0394 | -.007 | 18 |
| 17 | JAN66 FIJI IS. | -20.800 | -178.900 | 543 | 17 49 59.3 | .0966 | -.036 | 16 |
| 16 | APR66 FIJI | -21.100 | -178.600 | 511 | 15 23 29.3 | .0619 | -.006 | 20 |
| 08 | FEB66 FIJI IS.. | -21.200 | -178.500 | 525 | 10 02 09.0 | .0796 | -.025 | 20 |
| 17 | MAR66 FIJI | -21.100 | -179.200 | 624 | 15 50 32.2 | .1563 | .106 | 15 |
| 13 | APR66 SO FIJI IS | -23.600 | -179.900 | 550 | 04 27 54.8 | .0774 | .036 | 19 |
| 24 | JUN 66 FIGI IS | -26.700 | -177.300 | 146 | 08 17 49.1 | .0643 | -.004 | 20 |
| 26 | AUG66 KERMADEC IS | -27.500 | -177.300 | 99 | 00 51 51.3 | .1183 | .070 | 19 |

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# RELATIVE TRAVEL-TIME ANOMALIES

HERRIN68TRAVEL-TIME TABLES

INCLUDING ELLIPTICITY

REFERENCE STATION A0

ANOMALY REGION = SANTA CRUZ

DISTANCE RANGE = 10663 TO 10731 KM AZIMUTH RANGE = 259.2 TO 261.0 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11 MAR67 SANTA CRUZ | 10678.95 | 260.91 | -.054 | -.235 | -.047 | -.040 | -.161 | -.275 | -.176 | -.024 | -.145 | -.379 |
| 09 MAR67 SANTA CRUZ | 10671.39 | 260.84 | -.118 | -.208 | -.050 | -.021 | -.166 | -.213 | -.196 | -.019 | -.202 | -.379 |
| 09 MAR67 SANTA CRUZ | 10671.39 | 260.84 | 0 | -.159 | 0 | .009 | -.167 | -.232 | -.133 | -.041 | -.047 | -.304 |
| 09 MAR67 SANTA CRUZ | 10686.51 | 260.98 | -.188 | -.224 | .156 | -.130 | -.265 | -.238 | -.219 | -.016 | -.238 | -.173 |
| 13 JUN66 SANTA CRUZ | 10730.79 | 259.23 | -.070 | -.044 | .107 | .098 | -.060 | -.222 | -.194 | .093 | -.135 | 0 |
| 09 MAR67 SANTA CRUZ | 10671.39 | 260.84 | -.109 | -.176 | .040 | -.141 | -.207 | -.214 | -.236 | -.070 | -.275 | [illegible] |
| 09 MAR67 SANTA CRUZ | 10663.41 | 260.91 | -.013 | -.105 | .069 | -.031 | -.143 | -.177 | -.088 | -.071 | -.183 | -.325 |
| AVERAGE | | | -.092 | -.164 | .046 | -.037 | -.167 | -.224 | -.165 | -.021 | -.164 | -.312 |
| SIGMA | | | .061 | .069 | .083 | .082 | .062 | .029 | .057 | .055 | .080 | .084 |
| N | | | 6 | 7 | 6 | 7 | 7 | 7 | 7 | 7 | 7 | 5 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11 MAR67 SANTA CRUZ | 10678.95 | 260.91 | -.157 | -.300 | -.411 | -.477 | -.257 | -.064 | -.447 | -.667 | -.207 | -.806 |
| 09 MAR67 SANTA CRUZ | 10671.39 | 260.84 | -.107 | -.375 | -.337 | -.371 | -.213 | -.114 | -.500 | -.594 | -.235 | -.897 |
| 09 MAR67 SANTA CRUZ | 10671.39 | 260.84 | -.050 | -.258 | -.442 | -.438 | -.269 | -.051 | -.447 | -.478 | -.103 | -.859 |
| 09 MAR67 SANTA CRUZ | 10686.51 | 260.98 | -.059 | -.495 | -.597 | -.349 | -.381 | -.147 | -.517 | -.516 | 0 | -.915 |
| 13 JUN66 SANTA CRUZ | 10730.79 | 259.23 | -.107 | -.156 | -.299 | -.329 | -.208 | .103 | -.594 | -.509 | -.001 | -.801 |
| 09 MAR67 SANTA CRUZ | 10671.39 | 260.84 | -.058 | -.465 | -.549 | -.369 | -.173 | -.147 | -.551 | -.589 | -.381 | -.960 |
| 09 MAR67 SANTA CRUZ | 10663.41 | 260.91 | -.151 | -.285 | -.387 | -.281 | -.209 | -.071 | -.488 | -.519 | -.167 | -.940 |
| AVERAGE | | | -.098 | -.333 | -.432 | -.372 | -.273 | -.070 | -.537 | -.593 | -.182 | -.883 |
| SIGMA | | | .045 | .120 | .106 | .064 | .075 | .066 | .074 | .066 | .128 | .063 |
| N | | | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | 7 |

## EVENT PARAMETERS

| 7 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 11 MAR67 SANTA CRUZ | -10.700 | 166.200 | 49 | 08 33 27.4 | .0591 | -.015 | 20 |
| 09 MAR67 SANTA CRUZ | -10.700 | 166.300 | 30 | 03 24 18.9 | .0466 | -.014 | 20 |
| 09 MAR67 SANTA CRUZ | -10.700 | 166.300 | 59 | 18 02 45.7 | .0585 | .017 | 18 |
| 09 MAR67 SANTA CRUZ | -10.700 | 166.100 | 33 | 05 38 14.9 | .0904 | -.035 | 19 |
| 13 JUN66 SANTA CRUZ | -12.200 | 167.100 | 259 | 18 08 38.4 | .1044 | .078 | 19 |
| 09 MAR67 SANTA CRUZ | -10.700 | 166.300 | 33 | 05 52 19.2 | .0845 | -.058 | 19 |
| 09 MAR67 SANTA CRUZ | -10.600 | 166.310 | 30 | 04 58 35.7 | .0524 | .028 | 20 |

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# RELATIVE TRAVEL-TIME ANOMALIES

HERRIN68 TRAVEL-TIME TABLES — REFERENCE STATION A0

INCLUDING ELLIPTICITY

ANOMALY REGION = SOLOMON ISLANDS
DISTANCE RANGE = 10921 TO 11065 KM  AZIMUTH RANGE = 263.5 TO 273.1 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 29 JUL66 SOLOMON IS | 10920.87 | 263.48 | 0 | -.139 | -.011 | .006 | -.129 | 0 | -.170 | -.072 | 0 | 0 |
| 05 AUG66 SOLOMON IS | 10990.63 | 263.55 | -.097 | -.152 | -.056 | -.085 | -.110 | 0 | -.216 | -.094 | -.087 | 0 |
| 15 JUN 66 SOLOMON IS | 11026.23 | 265.04 | -.160 | -.162 | .060 | -.185 | -.131 | .291 | -.335 | -.144 | -.142 | -.230 |
| 01 AUG66 SOLOMON IS | 11026.53 | 264.90 | -.051 | -.165 | -.013 | -.085 | -.212 | .148 | -.160 | -.044 | 0 | -.292 |
| 28 AUG66 SOLOMON | 11032.16 | 273.08 | -.074 | -.117 | -.076 | -.115 | -.180 | .160 | -.176 | -.101 | -.069 | -.291 |
| 15 JUN 66 SOLOMON IS | 11026.53 | 264.90 | -.042 | -.262 | -.029 | -.236 | -.274 | .204 | -.313 | -.113 | -.108 | -.349 |
| 15 JUN 66 SOLOMON IS | 11012.52 | 264.19 | -.117 | -.219 | -.012 | -.130 | -.214 | .214 | -.246 | -.156 | -.189 | -.200 |
| 13 JAN 67 SOLOMON IS | 11035.37 | 264.41 | -.094 | -.210 | -.078 | -.149 | -.190 | .202 | -.249 | -.066 | -.163 | -.331 |
| 25 JUN 66 SOLOMON IS | 11033.65 | 265.11 | -.103 | -.057 | .029 | -.064 | -.172 | .213 | -.172 | -.091 | -.359 | 0 |
| 17 JUN 66 SOLOMON IS | 11034.15 | 264.97 | -.181 | -.142 | -.010 | -.145 | -.153 | .103 | -.174 | -.034 | -.207 | -.139 |
| 15 JUN 66 SOLOMON IS | 11065.25 | 264.97 | -.111 | -.282 | -.070 | -.205 | -.223 | .303 | -.154 | -.205 | -.228 | 0 |
| 28 JUN 66 SOLOMON IS | 11018.90 | 264.83 | -.243 | -.192 | -.038 | -.126 | -.276 | .215 | -.252 | -.102 | -.101 | -.309 |
| 15 JUN 66 SOLOMON IS | 11064.96 | 265.12 | 0 | -.264 | .003 | -.114 | -.246 | .221 | -.204 | -.049 | -.130 | -.338 |
| AVERAGE | | | -.116 | -.182 | -.023 | -.124 | -.193 | .207 | -.218 | -.098 | -.162 | -.285 |
| SIGMA | | | .059 | .065 | .041 | .064 | .054 | .058 | .058 | .049 | .083 | .064 |
| N | | | 11 | 13 | 13 | 13 | 13 | 11 | 13 | 13 | 11 | 9 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 29 JUL66 SOLOMON IS | 10920.87 | 263.48 | 0 | 0 | -.399 | -.205 | -.283 | 0 | 0 | 0 | -.242 | -.923 |
| 05 AUG66 SOLOMON IS | 10990.63 | 263.55 | -.234 | 0 | -.370 | -.270 | 0 | -.226 | 0 | 0 | -.401 | -.996 |
| 15 JUN 66 SOLOMON IS | 11026.23 | 265.04 | -.044 | -.491 | -.509 | -.107 | -.349 | -.196 | -.323 | -.264 | -.066 | -.970 |
| 01 AUG66 SOLOMON IS | 11026.53 | 264.90 | -.186 | -.335 | -.373 | -.149 | -.170 | -.044 | -.248 | -.503 | -.044 | -.844 |
| 28 AUG66 SOLOMON | 11032.16 | 273.08 | -.200 | -.339 | -.229 | -.169 | -.233 | -.157 | -.035 | -.298 | -.023 | -.782 |
| 15 JUN 66 SOLOMON IS | 11026.53 | 264.90 | -.171 | -.523 | -.417 | -.037 | -.211 | -.091 | -.308 | -.265 | -.078 | -.912 |
| 15 JUN 66 SOLOMON IS | 11012.52 | 264.19 | -.164 | -.490 | -.465 | -.128 | -.217 | -.124 | -.323 | -.304 | -.065 | -.833 |
| 13 JAN 67 SOLOMON IS | 11035.37 | 264.41 | -.131 | -.403 | -.424 | -.071 | -.262 | -.131 | -.277 | -.284 | -.037 | -.947 |
| 25 JUN 66 SOLOMON IS | 11033.65 | 265.11 | -.217 | -.468 | -.550 | -.226 | -.206 | -.205 | 0 | -.394 | -.059 | 0 |
| 17 JUN 66 SOLOMON IS | 11034.15 | 264.97 | -.137 | -.392 | -.484 | -.098 | -.235 | -.223 | 0 | -.249 | 0 | -.980 |
| 15 JUN 66 SOLOMON IS | 11065.25 | 264.97 | -.230 | -.393 | -.394 | -.200 | -.247 | -.226 | -.374 | -.316 | -.099 | -.936 |
| 28 JUN 66 SOLOMON IS | 11018.90 | 264.83 | -.120 | -.503 | -.431 | -.118 | -.243 | -.129 | -.241 | -.313 | 0 | -.963 |
| 15 JUN 66 SOLOMON IS | 11064.96 | 265.12 | -.223 | -.345 | -.477 | -.212 | -.316 | -.194 | -.364 | -.429 | -.140 | -.988 |
| AVERAGE | | | -.164 | -.420 | -.425 | -.153 | -.254 | -.162 | -.277 | -.329 | -.114 | -.923 |
| SIGMA | | | .060 | .071 | .000 | .068 | .049 | .059 | .102 | .079 | .113 | .060 |
| N | | | 12 | 11 | 13 | 13 | 12 | 12 | 9 | 11 | 11 | 12 |

## EVENT PARAMETERS

| 13 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 29 JUL66 SOLOMON IS | -10.500 | 162.800 | 75 | 11 46 15.6 | .0670 | .012 | 11 |
| 05 AUG66 SOLOMON IS | -10.900 | 162.300 | 93 | 04 33 07.4 | .0939 | -.024 | 14 |
| 15 JUN 66 SOLOMON IS | -10.100 | 161.000 | 39 | 06 13 52.3 | .0693 | -.011 | 20 |
| 01 AUG66 SOLOMON IS | -10.200 | 161.100 | 70 | 03 23 03.1 | .0728 | .037 | 19 |
| 28 AUG66 SOLOMON | -4.600 | 155.200 | 509 | 10 03 03.0 | .0909 | .050 | 20 |
| 15 JUN 66 SOLOMON IS | -10.200 | 161.100 | 33 | 01 32 55.5 | .0663 | -.005 | 20 |
| 15 JUN 66 SOLOMON IS | -10.600 | 161.700 | 33 | 01 32 12.0 | .0394 | -.003 | 20 |
| 13 JAN 67 SOLOMON IS | -10.600 | 161.400 | 32 | 13 48 11.7 | .0376 | .007 | 20 |
| 25 JUN 66 SOLOMON IS | -10.100 | 160.900 | 78 | 16 01 21.5 | .0787 | -.015 | 17 |
| 17 JUN 66 SOLOMON IS | -10.200 | 161.000 | 33 | 22 26 04.1 | .0643 | .020 | 18 |
| 15 JUN 66 SOLOMON IS | -10.400 | 160.800 | 31 | 00 59 45.8 | .0630 | -.034 | 19 |
| 28 JUN 66 SOLOMON IS | -10.200 | 161.200 | 33 | 11 39 02.1 | .0493 | -.810 | 19 |
| 15 JUN 66 SOLOMON IS | -10.300 | 160.700 | 18 | 16 36 24.1 | .0579 | -.028 | 19 |

11 15 67

# RELATIVE TRAVEL-TIME ANOMALIES

HERRIN68TRAVEL-TIME TABLES — REFERENCE STATION A0

INCLUDING ELLIPTICITY

ANOMALY REGION = CONTINENTAL U.S.****AVERAGES NOT VALID****
DISTANCE RANGE = 683 TO 2877 KM AZIMUTH RANGE = 101.3 TO 280.1 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 29 JUL66 CHASE VII | 2877.10 | 101.32 | .312 | 0 | 0 | .270 | 0 | .274 | 0 | .300 | 0 | 0 |
| 21 OCT65 E MISSOURI | 1416.70 | 121.71 | 0 | 0 | 0 | 0 | .297 | -.021 | -.074 | 0 | .224 | 0 |
| 03 APR66 COLORADO | 814.41 | 181.46 | .093 | .115 | .020 | .001 | .066 | 0 | -.102 | .108 | .077 | 0 |
| 23 JAN66 NEW MEXICO | 1077.96 | 183.22 | .063 | -.056 | .196 | .103 | .303 | .232 | 0 | 0 | .037 | -.015 |
| 17 MAR66 UTAH | 682.75 | 219.11 | -.149 | -.180 | -.167 | 0 | -.031 | 0 | -.287 | -.000 | -.172 | -.223 |
| 12 SEP66 NO CALIFORN | 1388.19 | 239.29 | -.029 | -.008 | -.011 | .166 | .083 | -.198 | -.066 | .133 | .189 | -.016 |
| 23 OCT65 WASH STATE | 1230.21 | 280.10 | 0 | 0 | 0 | 0 | 0 | -.317 | 0 | 0 | 0 | 0 |
| | AVERAGE | | .058 | -.032 | .009 | .157 | .143 | -.006 | -.132 | .135 | .071 | -.084 |
| | SIGMA | | .171 | .122 | .149 | .115 | .149 | .259 | .104 | .124 | .156 | .120 |
| | N | | 5 | 4 | 4 | 4 | 5 | 5 | 4 | 4 | 5 | 3 |

| EVENT NAME | DISTANCE | AZIMUTH | DJ | DA | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 29 JUL66 CHASE VII | 2877.10 | 101.32 | .014 | .618 | 0 | .346 | -.263 | .454 | .968 | -.381 | -.443 | 0 |
| 21 OCT65 E MISSOURI | 1416.70 | 121.71 | -.012 | .341 | .627 | .200 | .496 | 0 | .664 | 0 | 0 | 0 |
| 03 APR66 COLORADO | 814.41 | 181.46 | .174 | 0 | 0 | .063 | -.200 | .071 | .475 | .239 | .007 | -.121 |
| 23 JAN66 NEW MEXICO | 1077.96 | 183.22 | 0 | .338 | .331 | .235 | -.027 | -.203 | .274 | .015 | .114 | .075 |
| 17 MAR66 UTAH | 682.75 | 219.11 | -.089 | .249 | .281 | -.706 | -.070 | .296 | -.233 | -.862 | -.416 | .667 |
| 12 SEP66 NO CALIFORN | 1388.19 | 239.29 | .179 | .385 | .120 | -1.067 | -.192 | .223 | 0 | -1.043 | .294 | .033 |
| 23 OCT65 WASH STATE | 1230.21 | 280.10 | .575 | -.311 | 0 | 0 | -.173 | .436 | 0 | 0 | .032 | -.002 |
| | AVERAGE | | .140 | .270 | .340 | -.155 | -.034 | .213 | .429 | -.456 | -.069 | .278 |
| | SIGMA | | .238 | .310 | .212 | .585 | .332 | .248 | .450 | .549 | .297 | .335 |
| | N | | 6 | 6 | 6 | 6 | 7 | 6 | 5 | 5 | 6 | 5 |

## EVENT PARAMETERS

| EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 29 JUL66 CHASE VII | 36.600 | -74.100 | 1 | 04 36 24.8 | .3183 | .145 | 12 |
| 21 OCT65 E MISSOURI | 37.500 | -91.000 | 22 | 02 04 38.3 | .3120 | .188 | 10 |
| 03 APR66 COLORADO | 39.363 | -106.462 | 0 | 16 21 33.5 | .2149 | .064 | 16 |
| 23 JAN66 NEW MEXICO | 37.000 | -106.900 | 10 | 01 56 38.0 | .2130 | .053 | 17 |
| 17 MAR66 UTAH | 41.800 | -111.400 | 38 | 11 47 49.0 | .3004 | -.102 | 18 |
| 12 SEP66 NO CALIFORN | 39.400 | -120.100 | 8 | 14 41 01.7 | .2972 | -.091 | 19 |
| 23 OCT65 WASH STATE | 47.500 | -122.400 | 23 | 16 27 59.3 | .3607 | -.079 | 7 |

11 15 67

# RELATIVE TRAVEL-TIME ANOMALIES

HERRIN(68)TRAVEL-TIME TABLES INCLUDING ELLIPTICITY REFERENCE STATION AD

ANOMALY REGION = MISC. EASTERN IS AND PACIFIC OCEAN
DISTANCE RANGE = 4484 TO 10718 KM AZIMUTH RANGE = 184.3 TO 253.0 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 29 NOV 66 N EASTER I | 6185.31 | 184.28 | -.133 | -.069 | .065 | | | | | | | |
| 20 JUL66 N EASTER CD | 6659.33 | 185.83 | 0 | -.083 | -.004 | .011 | .159 | .027 | -.093 | .192 | .065 | -.035 |
| 18 SEP66 S PACIFIC 0 | 7681.44 | 207.05 | -.028 | -.199 | -.071 | 0 | 0 | 0 | .043 | .184 | .158 | -.119 |
| 21 JAN 67 EASTER IS | 10718.09 | 185.58 | -.045 | -.014 | .070 | .250 | .219 | -.196 | -.191 | .067 | .111 | -.167 |
| 24 SEP66 N PACIFIC 0 | 4484.06 | 214.97 | -.006 | -.119 | -.042 | .198 | .231 | -.077 | -.047 | .176 | .141 | -.088 |
| 05 SEP66 HAWAII | 5393.59 | 251.04 | .094 | -.042 | -.174 | .254 | .294 | -.141 | -.056 | .071 | .070 | -.194 |
| | | | | | | .108 | .055 | -.110 | -.306 | .053 | -.046 | -.923 |
| | AVERAGE | | -.023 | -.088 | -.023 | -.164 | .191 | -.105 | -.102 | .124 | .063 | -.138 |
| | SIGMA | | .083 | .065 | .096 | .104 | .090 | .087 | .125 | .066 | .073 | .070 |
| | N | | 5 | 6 | 6 | 5 | 5 | 5 | 6 | 6 | 6 | 6 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 29 NOV 66 N EASTER I | 6185.31 | 184.28 | .104 | .542 | .482 | -.450 | -.030 | .135 | .493 | -.456 | .004 | -.136 |
| 20 JUL66 N EASTER CD | 6659.33 | 185.83 | -.012 | 0 | 0 | -.279 | -.064 | .138 | .536 | -.439 | -.168 | -.112 |
| 10 SEP66 S PACIFIC 0 | 7681.44 | 207.05 | -.283 | .538 | .554 | -.313 | -.369 | .541 | .541 | -.268 | -.184 | .165 |
| 21 JAN 67 EASTER IS | 10718.09 | 185.58 | -.009 | .324 | .172 | -.434 | -.261 | .100 | -.083 | -.441 | -.423 | -.291 |
| 24 SEP66 N PACIFIC 0 | 4484.06 | 214.97 | -.132 | .572 | .698 | -.388 | -.123 | .223 | .472 | -.323 | -.149 | .388 |
| 05 SEP66 HAWAII | 5393.59 | 251.04 | -.480 | -.077 | -.219 | -.108 | -.438 | .111 | 0 | -.714 | 0 | -.551 |
| | AVERAGE | | -.135 | .380 | .337 | -.339 | -.247 | .200 | .436 | -.443 | -.164 | -.093 |
| | SIGMA | | .214 | .274 | .366 | .107 | .230 | .169 | .297 | .150 | .153 | .326 |
| | N | | 6 | 5 | 5 | 6 | 6 | 6 | 5 | 6 | 5 | 6 |

## EVENT PARAMETERS

| 6 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | NO. STA |
|---|---|---|---|---|---|---|---|
| 29 NOV 66 N EASTER I | -9.140 | -109.000 | 33 | 22 54 50.0 | .1244 | .047 | 20 |
| 20 JUL66 N EASTER CD | -13.300 | -111.400 | 33 | 13 22 54.0 | .0672 | .052 | 14 |
| 18 SEP66 S PACIFIC 0 | -18.480 | -132.800 | 33 | 06 40 36.0 | .1392 | .036 | 20 |
| 21 JAN 67 EASTER IS | -49.800 | -114.800 | 33 | 02 54 00.8 | .1560 | -.040 | 20 |
| 24 SEP66 N PACIFIC 0 | 12.000 | -130.800 | 33 | 08 57 10.2 | .1626 | .075 | 20 |
| 05 SEP66 HAWAII | 19.400 | -155.600 | 3 | 16 33 19.9 | .2707 | -.171 | 18 |

11 15 67

# R E L A T I V E  T R A V E L - T I M E  A N O M A L I E S

HERRIN68 TRAVEL-TIME TABLES  INCLUDING ELLIPTICITY  REFERENCE STATION  A0

ANOMALY REGION = MISCELLANEOUS - NORTH
DISTANCE RANGE = 2191 TO 9597 KM  AZIMUTH RANGE = 6.2 TO 334.5 DEGREES

| EVENT NAME | DISTANCE | AZIMUTH | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 23 JUL66 ON CHRLTTE | 2191.17 | 303.A8 | 0 | -.001 | .046 | 0 | .065 | -.021 | 0 | -.024 | 0 | -.057 |
| 14 JUL 66 G. ALASKA | 3150.73 | 305.73 | .121 | .094 | .008 | -.102 | 0 | 0 | 0 | -.091 | 0 | 0 |
| 02 JAN66 BAFFIN BAY | 3539.68 | 1A.90 | 0 | 0 | 0 | .032 | -.013 | .007 | -.012 | .026 | .037 | -.062 |
| 28 AUG66 ALASKA | 3809.42 | 325.68 | -.043 | .028 | -.063 | -.063 | -.011 | -.019 | -.005 | -.039 | -.007 | -.221 |
| 10 JUN68 ALASKA PEN | 3810.67 | 30A.19 | .085 | .105 | .000 | -.019 | .179 | .119 | .007 | -.015 | .199 | .033 |
| 23 DEC65 ALASKA PEN. | 3520.36 | 31A.49 | 0 | 0 | 0 | .010 | 0 | .199 | 0 | -.118 | .283 | -.809 |
| 29 APR68 ALASKA PEN. | 3A00.03 | 301.A8 | -.035 | .120 | -.081 | -.039 | .077 | .140 | .034 | -.030 | .233 | .085 |
| 12 AUG66 S ALASKA | 3948.52 | 30A.A7 | -.071 | .091 | -.039 | -.084 | .005 | .012 | .003 | -.034 | .070 | 0 |
| 17 JUL66 BERING SEA | 4190.33 | 307.A8 | 0 | .099 | 0 | 0 | .118 | 0 | .061 | -.002 | 0 | .027 |
| 17 DEC 66 JAN MAYEN | 5285.90 | 2A.77 | .225 | .041 | .038 | .061 | .124 | -.199 | -.139 | -.011 | -.051 | 0 |
| 27 OCT68 NOVAYA ZEML | 6616.08 | A.23 | -.116 | -.077 | -.031 | .015 | -.115 | -.103 | -.079 | -.077 | -.169 | -.153 |
| 18 JAN67 E RUSSIA | 7765.47 | 33A.46 | .047 | .041 | -.011 | -.077 | 0 | .169 | .050 | .040 | .229 | .035 |
| 30 JUN 68 CST E RUSS | 8486.41 | 32A.A3 | -.143 | .048 | .004 | -.079 | -.103 | -.009 | .027 | -.132 | .024 | -.186 |
| 01 DEC65 S. ALGERIA | 9596.94 | 5A.A2 | 0 | 0 | 0 | 0 | .159 | -.176 | -.953 | .255 | .844 | -.377 |
| | AVERAGE | | .006 | .053 | -.011 | -.031 | .037 | .003 | -.028 | -.022 | .079 | -.001 |
| | SIGMA | | .119 | .050 | .038 | .055 | .114 | .132 | .094 | .094 | .119 | .128 |
| | N | | 9 | 11 | 10 | 11 | 11 | 12 | 11 | 14 | 11 | 11 |

| EVENT NAME | DISTANCE | AZIMUTH | D3 | D4 | E1 | E2 | E3 | E4 | F1 | F2 | F3 | F4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 23 JUL88 ON CHRLTTE | 2191.17 | 303.A8 | .014 | 0 | 0 | -.089 | -.158 | .247 | 0 | 0 | 0 | -.174 |
| 14 JUL 88 G. ALASKA | 3150.73 | 305.73 | 0 | -.010 | 0 | .149 | -.118 | -.150 | .898 | -.297 | .165 | -.199 |
| 02 JAN68 BAFFIN BAY | 3539.68 | 1A.90 | 0 | -.101 | -.012 | -.008 | -.162 | -.372 | -.832 | -.380 | -.179 | -.581 |
| 28 AUG66 ALASKA | 3809.42 | 325.68 | -.109 | -.033 | -.107 | -.091 | -.258 | -.139 | .891 | -.419 | -.134 | -.263 |
| 10 JUN66 ALASKA PEN | 3810.67 | 30A.19 | .009 | .072 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 23 DEC65 ALASKA PEN. | 3520.36 | 31A.A9 | 0 | -.049 | -.053 | 0 | 0 | .278 | .131 | -.178 | .894 | -.091 |
| 29 APR66 ALASKA PEN. | 3A00.03 | 301.68 | .080 | .013 | .003 | .086 | -.087 | .017 | -.020 | 0 | -.013 | .091 |
| 12 AUG66 S ALASKA | 3948.52 | 30A.A7 | -.074 | .023 | .059 | -.110 | -.274 | -.010 | -.840 | -.558 | -.210 | -.078 |
| 17 JUL68 BERING SEA | 4190.33 | 307.A8 | .002 | 0 | 0 | 0 | 0 | -.073 | 0 | -.290 | .080 | -.197 |
| 17 DEC 66 JAN MAYEN | 5285.90 | 2A.77 | -.231 | 0 | -.178 | -.303 | -.430 | -.373 | -.227 | -.592 | -.173 | -.795 |
| 27 OCT68 NOVAYA ZEML | 6616.08 | A.23 | -.185 | -.121 | -.081 | -.335 | -.069 | -.305 | -.392 | -.622 | -.527 | -.566 |
| 18 JAN67 E RUSSIA | 7765.47 | 33A.46 | -.282 | .107 | .070 | .248 | -.415 | -.201 | .599 | -.245 | -.141 | -.236 |
| 30 JUN 68 CST E RUSS | 8486.41 | 32A.43 | -.167 | -.183 | -.186 | .045 | -.252 | -.017 | .085 | -.624 | 0 | -.492 |
| 01 DEC65 S. ALGERIA | 9596.94 | 5A.A2 | 0 | .110 | .044 | -.170 | -.205 | -.005 | -.005 | -.217 | -.253 | -.194 |
| | AVERAGE | | -.090 | -.008 | -.039 | -.053 | -.220 | -.128 | .017 | -.364 | -.117 | -.293 |
| | SIGMA | | .110 | .082 | .090 | .180 | .122 | .179 | .244 | .161 | .194 | .222 |
| | N | | 10 | 11 | 10 | 11 | 11 | 13 | 11 | 11 | 11 | 13 |

## E V E N T  P A R A M E T E R S

| 14 EPICENTERS | LATITUDE | LONGITUDE | DEPTH | ORIGIN TIME | SHOCK SIGMA | AV. ERROR | ND. STA |
|---|---|---|---|---|---|---|---|
| 23 JUL66 ON CHRLTTE | 54.500 | -134.900 | 33 | 19 34 57.0 | .1341 | .068 | 11 |
| 14 JUL 66 G. ALASKA | 56.200 | -149.800 | 33 | 12 18 17.0 | .1193 | .057 | 13 |
| 02 JAN66 BAFFIN BAY | 74.600 | -71.200 | 33 | 11 51 48.0 | .0949 | -.030 | 16 |
| 28 AUG66 ALASKA | 67.100 | -161.900 | 14 | 10 19 34.0 | .0577 | -.028 | 20 |
| 10 JUN68 ALASKA PEN | 57.400 | -155.700 | 67 | 14 12 15.0 | .0880 | .071 | 12 |
| 23 DEC65 ALASKA PEN. | 58.600 | -155.900 | 121 | 02 14 49.0 | .1482 | .071 | 12 |
| 29 APR68 ALASKA PEN. | 53.800 | -157.800 | 33 | 01 46 43.0 | .1170 | .071 | 19 |
| 12 AUG66 S ALASKA | 52.900 | -161.600 | 31 | 20 16 59.8 | .0803 | -.005 | 19 |
| 17 JUL66 BERING SEA | 58.500 | -166.900 | 35 | 01 03 03.6 | .1027 | .088 | 18 |
| 17 DEC 66 JAN MAYEN | 70.700 | -14.000 | 27 | 05 59 10.2 | .2043 | -.112 | 18 |
| 27 OCT66 NOVAYA ZEML | 73.400 | 54.800 | 0 | 05 57 58.0 | .1979 | -.136 | 20 |
| 18 JAN67 E RUSSIA | 56.600 | 120.800 | 11 | 05 34 32.8 | .1861 | -.073 | 19 |
| 30 JUN 68 CST E RUSS | 43.600 | 132.200 | A94 | 00 59 48.3 | .1100 | -.040 | 19 |
| 01 DEC65 S. ALGERIA | 24.000 | 5.100 | 0 | 10 29 58.0 | .1617 | -.001 | 15 |

Unclassified

Security Classification

**DOCUMENT CONTROL DATA - R&D**

*(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)*

1 ORIGINATING ACTIVITY (Corporate author)

TELEDYNE INC.
ALEXANDRIA, VIRGINIA

2a REPORT SECURITY CLASSIFICATION

Unclassified

2b GROUP

---

3 REPORT TITLE

LASA TRAVEL-TIME ANOMALIES FOR 65 REGIONS COMPUTED WITH THE HERRIN TRAVEL-TIME TABLE, NOVEMBER 1966 VERSION

4. DESCRIPTIVE NOTES (Type of report and inclusive dates)

Scientific

5 AUTHOR(S) (Last name, first name, initial)

Chiburis, Edward F.

6. REPORT DATE

10 January 1968

7a. TOTAL NO. OF PAGES

73

7b. NO. OF REFS

1

8a. CONTRACT OR GRANT NO.

F 33657-67-C-1313

b. PROJECT NO.

VELA T/6702

c.

ARPA Order No. 624

d. ARPA Program Code No. 5810

9a. ORIGINATOR'S REPORT NUMBER(S)

204

9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)

---

10 AVAILABILITY/LIMITATION NOTICES

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11 SUPPLEMENTARY NOTES

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12. SPONSORING MILITARY ACTIVITY

ADVANCED RESEARCH PROJECTS AGENCY
Nuclear Test Detection Office
Washington, D. C.

13 ABSTRACT

Travel-time anomalies at LASA, computed from 626 teleseisms with the November 1966 Herrin tables, are separated into various regions and then averaged. Several observations are made concerning the results.

DD FORM 1 JAN 64 1473

Unclassified

Security Classification

Unclassified

Security Classification

| 14. KEY WORDS | LINK A | | LINK B | | LINK C | |
|---|---|---|---|---|---|---|
| | ROLE | WT | ROLE | WT | ROLE | WT |
| LASA | | | | | | |
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